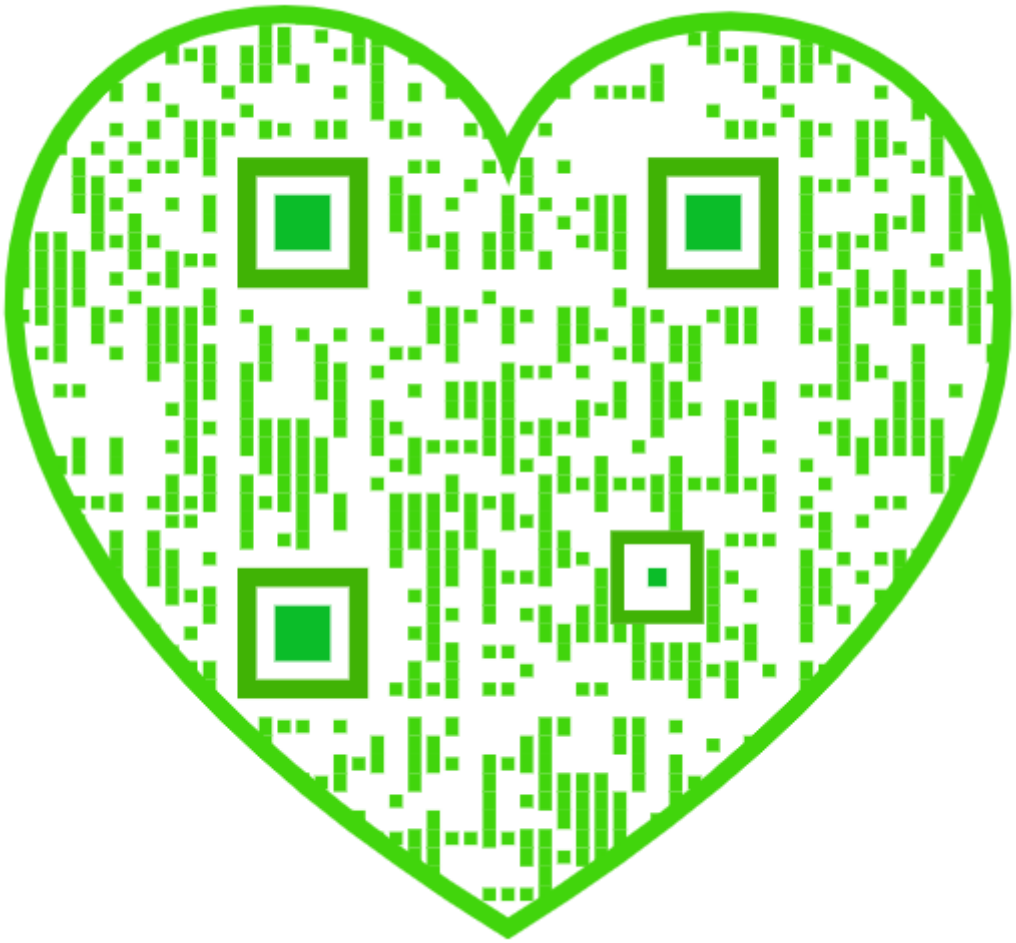

BUTCHERING, PROCESSING and PRESERVATION of MEAT

FRANK G. ASHBROOK

Fish and Wildlife Service
United States Department of the Interior

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To
WILLIAM HENRY TOMHAVE
whose enthusiastic teaching
inspired this book

PREFACE

This book is written primarily for the family to help solve the meat problem and to augment the food supply. Producing and preserving meats for family meals are sound practices for farm families and some city folks as well—they make possible a wider variety of meats, which can be of the best quality, at less cost.

Meat is an essential part of the American diet. It is also an expensive food. With the costs high, many persons cannot afford to buy the better cuts; others are being forced to restrict the meat portion of the diet to a minimum, or to use ineffectual substitutes.

Commercially in the United States, meat means the flesh of cattle, hogs, and sheep, except where used with a qualifying word such as reindeer meat, crab meat, whale meat, and so on. Meat in this book is used in a broader sense, although not quite so general as to comprise anything and everything eaten for nourishment either by man or beast. To be sure, it includes the flesh of domestic animals and large and small game animals as well; also poultry, domestic fowl raised for their meat and eggs, and game birds, all wild upland birds, shore birds, and waterfowl; and fish.

Born in Pennsylvania, the author was reared in an atmosphere where custom dictated the utilization of plainer foods in the concocting of tasty dishes. In his grandmother's family, a German cook, with knowledge of old-world ways and customs, brought into the household a happy solution to many of the food problems which confront us even today.

The author's first introduction to some phases of the home processing of meats came when, as a very small boy, his grandfather put him to chopping and grinding meat, fat, and suet, and mixing these with other ingredients in making sausage, headcheese, scrapple (*ponhaws* in Pennsylvania Dutch), and other meat concoctions.

Later, at the Pennsylvania State College as an animal husbandry student, he was taught by Professor W. H. Tomhave the scientific methods involved in dressing and curing meats.

After college, the author conducted research in swine production for the Federal Department of Agriculture at Beltsville, Maryland, and supervised the construction of an abattoir in which experimental hogs ran the gamut of slaughter, dressing, cooling, cutting, curing, and smoking. From this background and experience, the author expanded his research avocationally into the gastronomic art, to which he has been an ardent devotee throughout the years.

You who read this book may fall into one of the following categories: a livestock farmer specializing in cattle, hogs or sheep; a poultryman raising chickens, turkeys, ducks, geese, or guineas; a general farmer, keeping some livestock or poultry as a side line or for home consumption; a city or suburban dweller with a pen of chickens, pigeons, or rabbits in the back yard or lot; a person with a half interest in a pig, a lamb, or a calf that someone else is feeding until time for slaughter, and after dressing, a portion of the carcass is yours; a hunter who each season kills a deer, antelope, elk, moose, bear, or ducks, geese and upland game birds; a fisherman who frequently catches his limit; or you may be one of the more fortunate recipients from your generous friends who have an overabundance of good luck in the wild, and pass on to you a portion of their catch or kill.

Teachers and students in agricultural colleges, high schools, and vocational schools engaged in animal husbandry and home-economics studies will find the material in this book most helpful in their classroom and in their project work. All phases of the preparation of meat and meat products for home use, including slaughtering and dressing fresh and seasoned meat, cutting the carcass, refrigeration, curing, smoking, and canning, and the home tanning of hides and pelts are discussed in this book.

Carefully selected sources for those who desire more information than this book contains are given in the Appendix. This includes a list of publications issued by the United States Departments of Agriculture and the Interior, the State Game Departments, and reference books. Along with these, it seemed advisable to include a list of books that give methods and recipes for cooking all the meats discussed in this book. In addition, there is a directory of state agriculture experiment stations. Don't hesitate to ask your county agent for information and guidance.

A review was made of all recent scientific and practical literature in this field published in the United States, because the author believes it is not only desirable but essential that a book on practical meat economies be something more than a mere collection of ideas.

The author is especially grateful to the Agricultural Research Service, Agricultural Marketing Service, Federal Extension Service, and Forest Service, United States Department of Agriculture; to the Fish and Wildlife Service, United States Department of the Interior for material based on investigation and for permission to use photographs and drawings; also to the technical workers in the two federal departments for data and statistics obtained from research; to the Smithsonian Institution, Texas A. and M. College, Iowa State College, University of Missouri, and Pennsylvania State University for photographs and suggestions; to the Morton Salt Company and the National Livestock and Meat Board for material, including photographs and charts of wholesale and retail cuts of meat.

Sincere thanks are due to M. O. Cullen and Reba Staggs, National Livestock and Meat Board for charts, illustrations and data; to Professor J. H. Vondell, University of Massachusetts for photographs of cutting up a chicken, and to Dr. Jessop B. Low, Utah State College for illustrations of dressing wild ducks.

The preparation of this book has been a joint undertaking with Caroline McKinley Ashbrook who has contributed many constructive ideas and given valuable help and advice. Special acknowledgment is due Mary Ryan for suggestions of treatment, arrangement of material and splendid editing.

To all others who have lent material, called attention to special features, or aided with personal criticism or advice in the preparation of this book, the author desires to express appreciation and thanks.

FRANK G. ASHBROOK

Washington, D. C.
November, 1954

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I

MAN'S EATING CUSTOMS

Are you a creature of habit? Do you resist anything new in food? Are you in a gastronomic rut? Do you eat just those things your mother used to cook? Day after day, year after year, do you tread the tiresome trail of steak, gravy, and potatoes, little dreaming of the appetizing side trails, never knowing the challenge of America's great variety of succulent meats, game, and wondrously varied sea food?

Naturally temperaments vary, as do tastes in food. Let us consider the man of habit. He rises early in the morning and already has the day planned. A strict disciplinarian, he keeps all appointments and always on time. But when he sits down to dine what does he eat? Beefsteak or roast beef, of course, with potatoes and one or two other vegetables. Just good plain food. He has no flair for any dishes with a touch of the unusual.

The extreme opposite of this creature of habit is the chap whose pattern is unpredictable. His preferences for food are startling. He craves hummingbird wings sautéed in coconut oil, or Chinese eggs with the vintage of a century. He is convinced that these are foods for the gods.

Now the man who strikes a happy medium between these extremes is one of real taste, a true gourmet. He welcomes change and loves to embark on a new food experience. Savory roasts, luscious broiled chops, and steaks are relished by him, but his palate is always his guide. Eating a tasteless dish simply because it is exotic has no appeal for him.

The gourmet also enjoys the less familiar parts of meat animals often spurned by the uninformed. Heads, brains, kidneys, tongues, ribs, shanks, hocks, feet, and tails all make delectable concoctions when properly prepared.

Pigs' feet and spareribs may not sound glamorous, but they can be developed by proper culinary methods into pungent, sumptuous,

and delectable dishes. Even the most determined pessimist will find it difficult to refuse a serving of this "good eating."

Food has a greater effect on our health than any other element in our environment. Meals eaten in haste or leisure, aversion or enjoyment, are more important to our well-being than most of us realize. "Tell me what you eat and I'll tell you what you are," said Jean Anthelme Brilliat-Savarin, the celebrated French gastronome.

History tells us that prehistoric man was both herbivorous and carnivorous, and that he ate nuts, fruits, berries, leaves, and buds. He had birds' eggs, young birds, and honey; snails, frogs, fish, mussels, and crayfish. He obtained larger birds and small mammals by setting snares and by throwing sticks and stones.

Early man is sometimes described as a hunter of the great hairy mammoth, of the bear and the lion; but he probably hunted the smaller animals, the rabbit, the hare, and the rat, because his hunting implements were limited indeed. He had spears of wood, wooden clubs, and big pieces of flint. Nevertheless, he ate meat whenever he had the chance and consumed part of the kill wherever it fell; but he brought back the big marrow bones to crack and eat at leisure, for great quantities of these cracked and split bones have been found in caves. He hunted the horse as well as the reindeer and bison. Bone deposits show he ate much horsemeat.

FIG. 1. Prehistoric tribesmen hunted wild horses for meat.

Later, as man's expertness in hunting, trapping, and fishing increased, he naturally ate more meat than vegetables. Undoubtedly, man's wild instincts caused him to love the chase, which he preferred to the work entailed in searching for vegetable food, so he became largely a meat eater. Perhaps that is why the American Indian was such a meat eater.

The early Greeks subsisted largely on meats. They preferred pig, but also ate cattle, sheep, and poultry. Fish and game were sought as food. Later, the consumption of meat in Greece became less important because such food was only offered at religious festivals. At such occasions, the masses had an opportunity to enjoy this luxury.

The wealthy Romans were indebted to the Greeks for their yen for meat, but the common people ate little of it. The edible organs, including tripe, were their fare, but the proletariat literally devoured meat on the numerous holidays.

It has been estimated that, of the two million known species of animals, only fifty have been domesticated and normally contribute to the food supplies. However, in many localities, man's ingenuity is making full use of local animals, and he is becoming master of his environment.

Of the Australian aborigine it may be said that in terms of food, nothing living is alien to him—the caterpillar and the moth, the frog and the kangaroo are trapped by appropriate and effective methods and eaten with relish. Certain African tribes are catholic in taste; snails, frogs, crocodiles have their place in the diet.

There are many regions where the ordinary staple foods are supplemented, perhaps at irregular intervals, through hunting, trapping, and fishing. These occasional supplements make important contributions to the diet.

The fundamental biochemical investigations of the past half century, conducted chiefly in Europe and North America, provide the basis for the approach to nutrition problems on all continents, yet there is much to be learned from well-established food habits in various countries, in that primitive peoples in many areas have succeeded in reaching good dietary standards.

Eating was no problem for the early American Indian, trapper, trader, and mountain man. They obtained the finest meat on the continent from the buffalo, elk, deer, and antelope. Great herds of these big game animals roamed the plains and provided an abundance of fresh meat. Probably no other primitive peoples had such a bountiful supply.

This wild meat was surprisingly rich and easily digestible. The Indian squaw raised a few vegetables but these were a meager sup-

plement indeed to the diet. All the evidence points to the fact that the Indians were chiefly meat eaters and consumed enormous quantities of it.

"The Indian is a great epicure," said Colonel Richard Dodge, "knows the choicest tidbits of every animal, and how to cook it to suit his taste. The great fall hunt yields to him the fullest enjoyment of his appetite."

History records that the average Indian ate from 10 to 15 pounds of buffalo meat daily; if it was abundant and he could select the parts that best suited him, he would consume as much as 20 pounds.

As soon as the Indian made his kill he would cut open the buffalo and select his raw tidbit or hors d'oeuvre. He made generous use of glandular and visceral tissues, and was particularly fond of the honeycomb stomach, or tripe, also the liver, lungs, and small intestines, raw or roasted.

FIG. 2. The buffalo furnished the American Indian, trapper, trader, and traveler the finest meat on the continent.

The de'pouille, a fatty tissue lying along the backbone just under the hide and extending from shoulder blade to the last rib, was cut and pulled out all in one piece. It was then dipped in hot fat for a short time and hung up inside the tepee. Here this choice morsel would dry and be smoked for a day or two. Cured in this manner,

it kept indefinitely and was used principally as a substitute for bread.

The flesh of the buffalo or bison, in good condition, is juicy and well flavored, and resembles that of beef. The tongue, in pioneer days, was deemed a delicacy, either roasted, boiled fresh, or cured and smoked. Smoked buffalo tongue was considered to surpass in flavor and texture that of the cow or steer. The hump of flesh covering the long spinal processes of the first dorsal vertebrae was also much esteemed. Fine-grained, mellow, and when partly salt-cured and sliced crosswise, it was considered as rich, tender, and luscious as tongue. Hump ribs and other choice cuts were roasted in the deep ashes of a fire, as were the marrow bones. These portions of the buffalo were most relished by the trappers, traders, pioneers, and travelers who came later.

The Indians also laid up large winter stores of buffalo meat. To acquire this meat, they staged large community hunts. Before winter, in this manner, they would store as much as 5,000 pounds of dried buffalo meat in certain localities.

Pemmican was made from buffalo, deer, and antelope. The raw meat was cut into thin slices, wound about sticks which were slanted over a slow fire or laid upon a rick of wickerwood, and allowed to dry. Often the sun alone would furnish sufficient heat to dry the meat. These dried slices of meat were then pounded into a flaky mass, and over alternating layers of it, fat was poured. This mass was then packed in bags made of buffalo or deer hide; thus making a compact and nutritious food which could be kept indefinitely. Pemmican was quite acceptable to the taste and became the standard food of the trappers and mountain men when on the trail.

The white men who early invaded the Great Plains quickly adopted the hunting and eating customs of the Indians. Those who crossed the plains lived exceptionally well on unlimited quantities of choice cuts of buffalo and antelope. These hungry mountaineers relished the appetizing brown intestines, ribs of the tender hump, and baked tongues, so soft, sweet and well-flavored. When such a quantity of primitive food was readily available, white men and Indians knew very well the portions of the carcass they liked best.

From the earliest times, buffalo meat was the chief sustenance of the pioneers as they journeyed westward. Later it was the staple meat served in hotels and restaurants through the buffalo country.

After guns were acquired by the Indians, and the trappers and traders organized systematic hunts, the buffalo herds were greatly reduced. It was the beginning of a real exploitation, with a growing

trade in hides, robes, and pemmican. This was the threat that led to the practical extermination of the wild buffalo in the United States.

The tongue hunters were more wasteful than the hide hunters because they simply killed for tongues alone, and the rest of the carcass was left on the plains. The tongues were cured, smoked, packed in barrels, and shipped to the large eastern cities. Occasionally, some of the meat was pickled and sent to market; and, at times during the winter, buffalo carcasses were also hog-dressed and shipped east, but more often the hindquarters were the only portion utilized.

Today there are about 9,000 buffalo on Federal, State, and private lands in territorial United States. The U. S. Fish and Wildlife Service maintains four fenced refuges for buffalo and elk, where the animals run at large and are maintained as nearly as possible under natural conditions. An annual disposition of surplus animals is made from these areas to avoid overgrazing. Both live and butchered animals are generally available.

The Director of the Fish and Wildlife Service determines each year, usually in August, the number of animals that are surplus on each refuge and establishes the prices at which they will be sold.

The first settlers on the shores of America—the Dutch, British, French, Spaniards, Germans, and others—brought with them from the Old World their own eating customs. All these people have contributed to the development of fine American food.

Old and New Techniques Combined Solve Meat Problem

As trade opened up with the Orient and the West Indies, the American table was enriched by the addition of pepper, curry, and all sorts of spices, tropical fruits, chocolate, coffee, and rum. With this oriental touch, and drawing upon European lore, an entirely new school of cooking began to develop.

One might ask, what has all this to do with the meat situation and how does it relate to our present problems? Many of the recipes and methods for butchering and preserving meat developed during the Colonial period have come down to us without much alteration, some of them exactly as the Indians and colonists taught them to our ancestors. Many of the formulas are as valid now as they were in the good old days. We can benefit immeasurably, then, if we combine modern techniques with the thrift and ingenuity of our forefathers. It is the constant increase in the cost of living that

forces us to adopt old-world economies which we have more or less been neglecting. We are fortunate in having a unique grip on the combination of the old usages with the new techniques. In attempting to solve the meat problem, today's generation may find in these new approaches a satisfactory and practical solution—a new frontier not only for American farm and suburban families but for city families as well.

It matters not whether your fresh meat comes from a farm, a suburban property, a vacant lot, a back yard, or a wholesale meat market; nor if it is shot or trapped in the wild or fished from a farm pond, brook, lake, river, or ocean—somewhere in this book is a solution to your meat problem.

Perhaps you prefer not to kill, dress, and cut up an animal, a bird, or even a fish. Do not let any of these processes between the kill and the range frustrate you. They can be met by your local butcher or those employed at the local cold-storage locker plant, who will be glad to render this service.

Freezing meat, poultry, fish, and game in the home freezer or locker plant is the latest thing in food preservation. With modern methods of freezing, any day of the year a family can have a luscious steak, fried chicken, baked fish, broiled rabbit, or barbecued game. Cold-storage lockers and deep freezers have a great appeal, because they furnish storage space for fresh foods the entire year. It is the easiest way and requires the minimum of time and energy. Whether the meat is produced by you or purchased wholesale alive or dressed, there is a considerable saving. You can save money and live better by purchasing meat in quantity and preserving it. It is not an uncommon procedure these days for people to purchase cattle, hogs, sheep, poultry, and fish at wholesale when the price is right, and dress and butcher them at home, or have the locker plant or the local butcher do the work.

Freezing is a practical, desirable way to preserve meat, poultry, and fish, but it is not the only method. There are others, such as brine and dry curing, corning, pickling, drying, smoking, and canning. All are good, add variety, and make the meals most delectable with that country-cured taste.

Facts About Meat

Meat makes the meal. It is the dish that gets star billing at the table. Nearly everyone thinks there is nothing else like the prized savoriness of meat. It stimulates the appetite and makes the whole

meal seem more interesting and full of flavor. Formerly meat was regarded by many as the cause of most of the ills to which we are heir. Now it is considered a must in our diet instead of a necessary evil.

One of the chief reasons that the meat supply does not meet human demands is that man has concentrated his appetite on fewer and fewer animals for meat. It is surprising to note that away back in the Middle Ages meat was more varied and occupied a more important position in the cuisine.

Swans, peacocks, peahens, and many other species of birds and animals, such as deer, pheasants, and quail, were kept in domestication or semidomestication. Rabbits, woodchucks, raccoons, and opossums offer possibilities for much more exploitation as dinner meats.

Meat is good for you. It should comprise a basic part of the daily diet of every healthy person. It provides energy, health, and vigor. While meat is used as the main dish in meals day after day, it never becomes monotonous. This is because there are numerous varieties of meats and so many interesting and appetizing ways in which they may be prepared and served. Meat surely has appetite appeal and it satisfies.

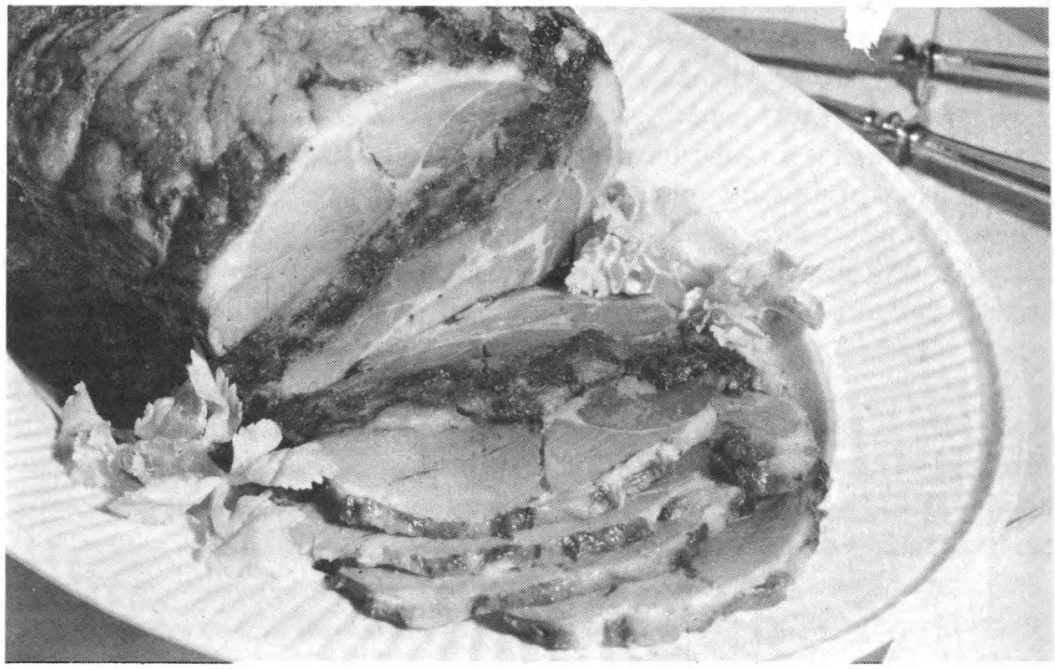


FIG. 3. Meat should comprise a basic part of the daily diet of every healthy person. Roast fresh or cured pork shoulder, with savory stuffing, can supply this essential part of the daily diet, cheaper and every bit as tasty as ham.

Meat is important primarily for high-quality protein. It also provides iron, copper phosphorus, fat, thiamine, riboflavin, niacin, and vitamin A. Lean meat is primarily protein. The lean and fat tissues are highly digestible and are easily and rapidly assimilated. Meat proteins have a high digestibility, and the amino acids contained in it are biologically complete. Therefore, it is natural that meat plays an important part in keeping the human body in order.

The value of any food is directly dependent upon the thoroughness with which its nutrients are utilized by the body. Beef, veal, lamb, and pork are all digested quite thoroughly since 97 per cent of the proteins and 96 per cent of the fats are digested. Pork, however, takes a little longer to digest, as does turkey. There is no difference, however, in the digestibility of red and white meat and fowl. After all, the chief reason for the popularity of meat is its palatability, which consists of tenderness and flavor or aroma and taste.

Changes After Slaughter

After slaughter the animal heat leaves the carcass; this is hastened by chilling. Refrigeration also causes the fat and muscle to become solid and hard. Consequently, meats become rather firm in the cooler. When meat is in refrigeration, other changes take place.

The meat firms up and remains so for some little time. Fresh meat is usually tough and tasteless. After 24 to 36 hours of chilling, however, the meat becomes progressively more tender. Then the enzymes gradually soften the tissues, making them more tender.

Remember that bacteria are found in foods not sterilized, and this is also true of meat. These will begin to grow and act on the meat. They consist of molds, yeasts, ordinary types of bacteria, and spore-forming spoilage bacteria. Oxygen in the air and enzymes in the meat affect the fat and thus tend to make it rancid. When meat is kept in the cooler for weeks, some rancid fat may be found on the surface of the meat. The bacterial growth mentioned previously and the effect of oxygen in the air on fat are changes of an undesirable nature. Therefore, precautions to prevent these changes must be taken to keep meats fresh and to prevent spoilage.

All meats are highly perishable. The primary cause of low or inferior quality, off flavor, taint, or actual spoilage is due to allowing the natural forms of bacteria to develop and multiply. Therefore, bacteria from within and outside of the meat must be prevented from multiplying and held in check until the meat is cured, smoked, or otherwise preserved.

The pink or red color of meat is produced by muscle and blood hemoglobin. This is an important criteria in judging meat. Beef and some other red meats are always darker when first cut. Upon exposure to the air for a short time, however, the hemoglobin becomes oxidized, thereby producing a brighter shade of red.

Generally speaking, the older the animal, the darker the meat; but frequently dark meat occurs in fairly young animals after the carcass is cut up. The bone, then, is the determining factor, for it is red and porous in young animals, whereas in old ones it is hard, white, and flinty. Therefore, dark meat may occur regardless of age; although it is a characteristic of the flesh of older animals or of meat that has been cut for some time. Meat that has been aged or seasoned for a month or more becomes very dark, also moldy or slimy on the surface. This can be removed by cutting off thin slices and the newly cut surface will be bright red again.

Fresh and Seasoned Meat

Meat from an animal just slaughtered or shot is usually tough and tasteless. Beef, mutton, venison, and game birds become more tender and palatable by the process of ripening, hanging, aging, or maturing. Pork, veal, and lamb, however, should not be aged, for nothing is gained. Therefore, these animals should be processed as soon as possible after butchering and chilling.

The difficulty of developing well-seasoned meat has always been an uncertainty because of bacteria. The primitive method of hanging a carcass in the attic of the farmhouse or in an outbuilding is slowly giving way to the use of cold-storage lockers and home freezers, although it is still common practice for hunters to hang game for a period of seasoning.

What makes meat tender? There are about twenty-five enzymes in meat. Enzymes are ferments. They act on the proteins, carbohydrates, and fats in the meat and break down the connective tissue, reducing it to a gelatinous consistency. This process makes meat tender and also improves its palatability, since certain juices are released which enhance the flavor.

The same enzyme action takes place in professional ripening as in home hanging. The chemical changes must occur to make meat tender through nature's process. "But by contrast," says M. O. Cullen,* meat carving expert of the National Live Stock and Meat

* *How to Carve Meat, Game and Poultry,* by M. O. Cullen, McGraw-Hill Book Company, Inc., New York, 1941.

Board, "one is done under the strictest hygienic conditions with every step of cleanliness and moisture control (so encouraging to the growth of molds), vigilantly watched, while the other relies primarily on faith, hope and naked-eye sentinel service."

At a temperature of 35° to 38° F., three to five days of storage between slaughter of a hog and consumption of the fresh pork is regarded by many as an optimum period.

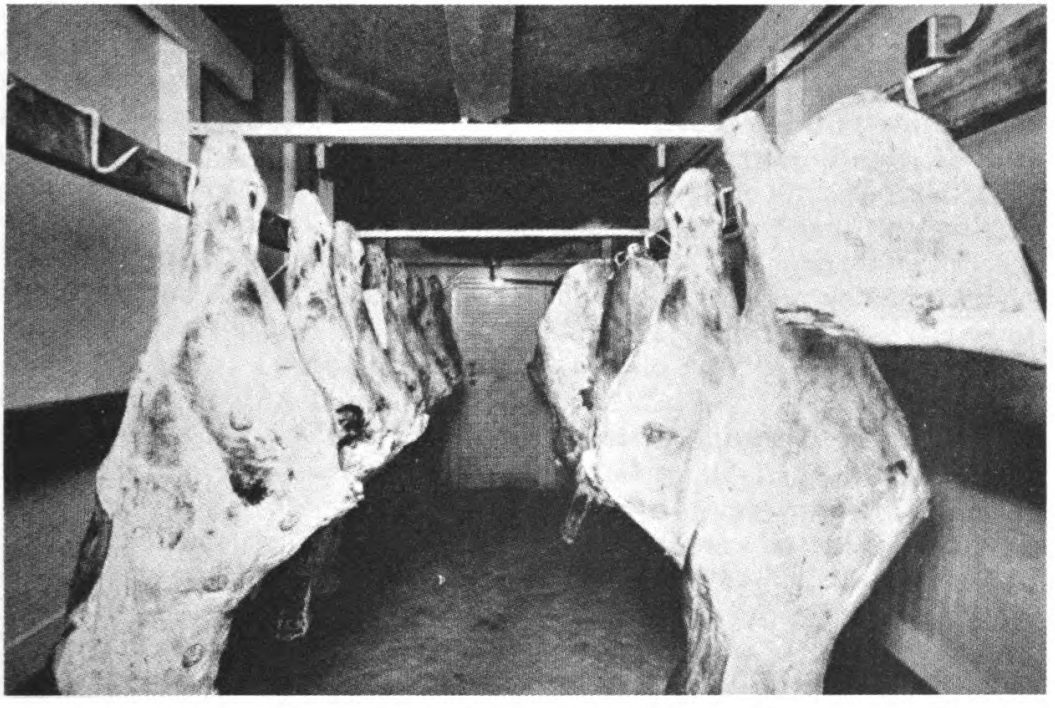


FIG. 4. A typical meat cooler. Good quality beef and mutton will chill and season in 7 to 10 days in a cooler 35° to 45° F. Highly finished beef can be ripened for 6 weeks. Venison and other game may be kept to advantage for 2 weeks or more.

Good quality beef and mutton having a firm texture and a coating of fat on the outside will chill and season in 7 to 10 days in a cooler set at 35° to 45° F. Highly finished beef can be ripened for 6 weeks. Venison and other game may be kept to advantage for 2 weeks or more.

Any family wishing to solve the meat problem has a choice of several alternatives for storing fresh meat. For example, use may be made of one of the million or so lockers located in more than 11,000 frozen locker plants, where, for a nominal fee, meat can be dressed, wrapped, frozen, and stored until the family is ready to use it. The home freezer is also useful in preserving a large variety of meats. The meat can be sharp frozen at the locker plant in the

usual way or in the deep freeze, then stored in the home freezer until it is to be cured or cooked. If the family does not have access to either of these modern conveniences, the only course is to hang the meat in a cool outbuilding, trusting to luck that it will be in good condition when the time arrives for eating or curing.

Mr. Cullen says:

In this primitive method of ripening, birds and small game usually present no problem because they can if necessary be eaten quickly without sacrificing too much in the way of flavor. It is the big game, such as deer, elk and moose, that are most troublesome, since like beef this class of meats improves with aging. The English usually hang the large carcass at least 14 days; however, their climate is somewhat more steadily cool than ours. Here 10 days of hanging is about the general practice, and certainly nothing less than a week will accomplish very much toward making the meat more tender. The animal's age will have some relation to the length of the ripening period, and if the carcass is that of an old buck it is best to give it some extra time if possible.

Needless to repeat, the place where the carcass hangs should be as cool and dry as possible, and it is advisable to leave the skin on as added protection during the aging period. Later, after the skin has been removed and the backbone split, it is a wise precaution to strip out the spinal cord, which runs along the backbone.

Birds present no complications in the matter of size and space, but they do require a watchful eye, and the delicate decision as between the moment of full aroma and risking another night's hanging has caused countless hunters many an uneasy hour. They usually reach their "high" moment just as they begin to decompose and with their full quota of perfumes achieved. Timing to this split second of greatest succulence must be done without benefit of rulers or meters and sometimes the least wrong calculation may result in sacrificing the bird.

Since birds are always hung in their feathers these serve as a great protection against flies. But it is advisable as an added precaution to apply a good sprinkling of pepper, which can be counted on to keep the pests away. In cold, frosty weather, birds may hang 10 days safely without much fear of becoming tainted. If the weather should be damp and muggy, it is well to provide a larder or storehouse with a good current of air and cut the hanging period when necessary. An old country prescription suggests covering the birds loosely with a thin cloth. In some households the custom is to hang birds by their heads only; in others, strings are tied to both ends and the hanging position is changed every day, alternating from head to feet.

Partridge taints first in the crop; other birds start to decompose around the vent. In either case, as soon as there is the first sign of taint, remove the feathers and draw the birds. Wash them in water that is well salted and add a little vinegar to the rinse. If they are badly tainted, repeat with

two or three different solution changes, and finally wash off with clear, fresh water. Dry them thoroughly and place a little piece of charcoal or some powdered charcoal in a muslin square inside the crop before cooking. They may be cooked with the sweetener in them but remember to remove it before serving. If there is no charcoal at hand, place some charred wood in the oven until it is burnt through and use this the same as you would the charcoal.

Whatever opinion or prejudice may be held in regard to gaminess, one thing is quite certain: the meat of freshly killed game and that of "high" game are totally different. Fresh meat is flavorless, whereas, when reasonably high, meat is tender, full of taste and of incomparable flavor. Taste varies with individuals; so handle the storage of the game the way you like best.

FIG. 5. Choice rib cut showing a high degree of marbling of fat in the lean, which denotes quality.

There are other methods of ripening or tenderizing meat. Freezing meat is a tenderizing process; but once frozen it should remain that way until it is to be cooked, as intermittent freezing and thawing causes it to loose flavor and lowers the keeping quality.

Science has contributed much to the processes of maturing meat. The "tenderay" process has put meat tendering on a purely scientific basis. Three years of research at the Mellon Institute evolved this

method. It is a combination of controlled higher temperatures made possible by the sterilamp, humidity, and air circulation. This treatment tenderized beef so rapidly that results were produced in 2 days which formerly required 2 or 3 weeks. In fact, the investigators claimed that this method of tenderization improved the eating quality of beef by several grades. There was also a substantial saving to the meat industry and noticeable increase in customer satisfaction. The "tenderay" process can improve all grades of meat, but it raises the questions of whether increasing the tenderness alone enhances the grade and if the consumer will be able to pay the extra tax on the per pound cost of such treated meat. There are still other methods of tenderizing meat, such as grinding, scoring, cubing, and marinating. These are usually applied to meat cuts and not to the entire carcass.

A recent development to make tough meat tender is a compound of salt-like crystals, the active ingredient of which is a vegetable enzyme, papain, obtained from the papaya melon. This meat tenderizer is winning a place on grocers' shelves all over the country, largely because food experts agree that it puts good meat back on the family menu in the face of soaring prices.

It is important to sprinkle the tenderizer evenly and then allow the treated meat to stand at room temperature 30 minutes for each half inch of thickness. Thus, an inch-thick steak, sprinkled on both sides, should stand for one hour before cooking. Thick roasts (beef, lamb, or pork) can be tenderized in 2 or 3 hours. Roasts so treated have up to 20 per cent less shrinkage; hamburgs, too, cook plump and juicy without shrinking.

II

MEAT CHARACTERISTICS

In order to handle and preserve meats satisfactorily one should know something about their structure and composition and the animals that produce them. That these animals are not uniform in structure is apparent to anyone who has had a steak or a roast.

Meat includes all parts of domestic and wild animals and birds used as food. Lean flesh, fat flesh, skin, edible glands, and organs all classify as meat. Certain meats also are sold, cooked, and eaten with the skin attached. This is true of some cuts of pork, also fowl and fish.

Structure of Meat

Meat is composed mainly of lean muscle, fatty and connective tissue, bones, and skin. In addition, there are blood vessels, lymphatic vessels, glands, and nerve tissue. The skin or hide is, of course, on the outside. The bones are in or near the center in some cuts of meat; in others, near the inside surface where they are plainly visible. Most of the balance of the meat cut is more or less lean meat. However, fat tissue is generally found under the skin and lying between the separate muscles of the meat. Fat is distributed more generously throughout the lean tissue and gives it a "marbled" appearance. This is always the case in a well-fattened animal.

The lean tissue or muscles are made up of bundles of muscle cells. They are tubular in shape, minute in diameter, and of various lengths. These bundles of muscle cells are bound together by a fine network of connective tissue. It follows, then, that the smaller and more numerous the muscle cells, the greater the amount of connective tissue. The connective tissues are much less tender than the cell content, and their presence in large quantities characterize the less tender meat. The small bundles of muscles are, in turn, bound together by connective tissue to form larger bundles, and some of these larger bundles are held together by connective tissue to form

a large voluntary muscle. These muscles comprise most of the meat cuts.

There is a heavy accumulation of connective tissue at the end of the muscle to form the tendon, which affixes the muscle to the bone. That is why the center portion of a muscle is tender, while the cuts from the extremities are tough. Connective tissue increases in amount and becomes tougher as the animal grows older. Meat from younger animals is therefore more tender than meat from old ones.

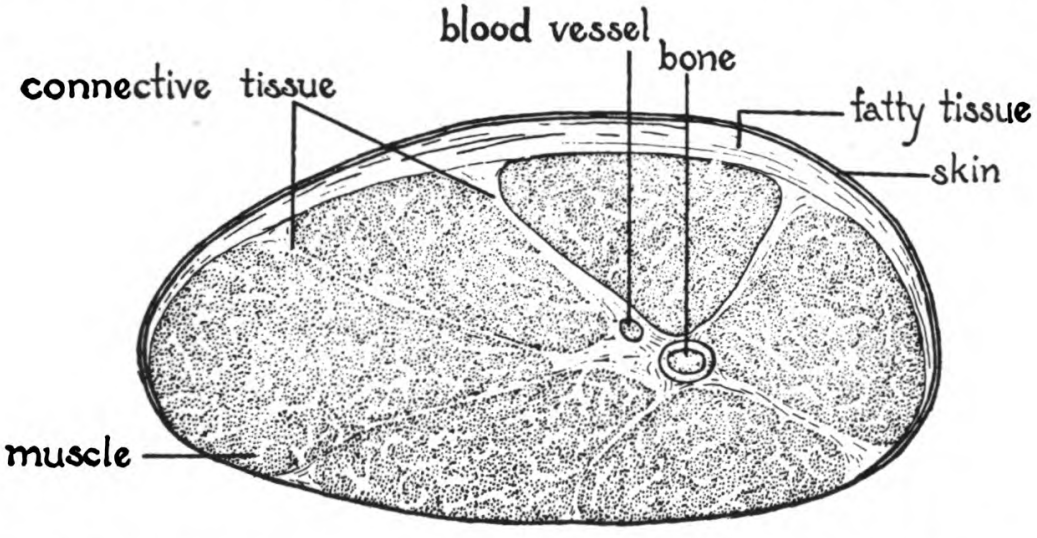


FIG. 6. Cross section of a ham showing where the four classes of tissues are found.

When a meat animal begins to fatten, it deposits fat first around some of the internal organs—kidneys, stomach, and intestines. Fat is also deposited in certain cells of the connective tissue, although some fat in small quantities may appear in any cell of the connective tissue. There are certain cells, known as fat cells, in which quantities of fat may be stored. This deposition of fat greatly inflates these cells and causes the cell walls to expand and become thinner. When one bites into a piece of meat containing considerable fat, the cells are easily broken in chewing and therefore such meat is more tender than that containing little fat.

COMPOSITION OF MEAT

Meat, except the bone, is rather soft and contains considerable water. In fact, lean muscle may be 75 per cent water. The remainder is 20 per cent protein, about 1 per cent mineral matter, some 3 per cent fat, together with small amounts of glycogen, meat extractives, and other miscellaneous organic substances.

The white or creamy-white parts of meat are connective tissue, ligaments, and fatty tissue. These also contain water, fat, protein, and mineral matter. The fat (chemical fat) may make up 95 per cent of such fat tissue as kidney fat. In body fat, such as the fat found on a roast, the percentage of true fat will be less, and may be as little as 5 or 10 per cent in lean animals.

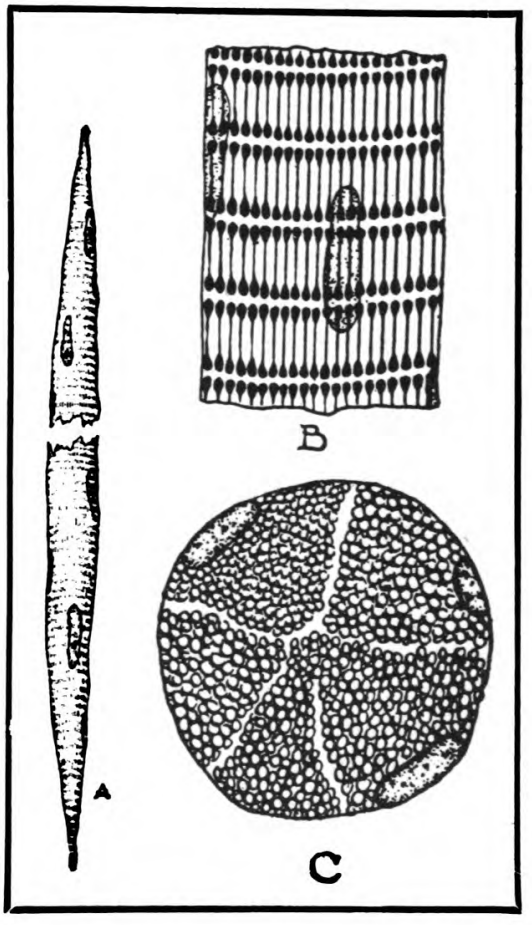


FIG. 7. High magnification shows that the lean muscle is made up of long slender fibers, cylindrical in shape. (a) These individual fibers are about 1/500th inch in diameter and often an inch or more in length; (b) longitudinal; and (c) cross section.

Bones also contain water, fat, protein, and mineral matter, but the four chemical substances are more nearly equal in the bones. Fresh bones of beef cattle may contain 30 to 40 per cent water, the fat may run from 15 to 20 per cent, and the protein content may also be 15 to 20 per cent. The remainder is mineral matter and forms from 15 to 25 per cent of the total.

The skin of meat animals also is composed of water, protein, fat, and mineral matter. The water content of the skin of young veal may be as high as 70 per cent, while that of old cattle may be as low as 50 to 55 per cent. Fat is present in small amounts, usually 5 to 6 per cent or less. The protein content is usually 30 to 40 per cent, and the ash from 1 to 1.5 per cent.

Meat as Food

Nutrition is the science that deals with food at work—food on the job for you, says the United States Department of Agriculture. The right food, it claims, helps us to be at our best in health and vitality. It can even help us to stay young longer. An individual fed properly from babyhood has a chance to enjoy a long life. But at any age, you are better off when you are well fed.

Food scientists in the Department of Agriculture know all about the body's needs. They know that from vitamin A to the mineral zinc, a list of nutrients—chemical substances that the body is known to require from food—totals more than 40. And there may be some yet undiscovered. You can eat well and properly without being introduced to all of the body's A to Z requirements. Making sufficient provision for certain key nutrients will assure you of getting the rest. Let us consider these key nutrients and see how much meat contributes to the body's building and repair.

Food Nutrients

The Greeks, as always, had a name for the first one, "Protein," and believe it or not, it means "first." And even down to a hundred years ago it was recognized as the main substance in all the body's muscles and organs, skin, hair, and other tissues. The top-rating proteins are always found in foods from animal sources—meat, poultry, fish, eggs, milk, and cheese. Calcium, the chief mineral material in bones and teeth, is not supplied by meat to any considerable extent. The outstanding foods for calcium, however, are milk and leafy green vegetables; but for calcium to be assimilated properly, the right quantities of vitamin D and phosphorus are required, and these may be supplied by seafood and meat. Another essential material for red blood is iron. It may be supplied from many different foods. Liver is outstanding for iron. Meat in general adds iron, and leafy green vegetables have high iron content. The body requires a small but steady amount of iodine. Salt-water fish or other food from the sea will help a great deal in supplying iodine. It is wise also to use iodized table salt regularly as a safety measure.

When you eat a variety of foods, you are pretty sure of getting the vitamins you need. Vitamin A is important to the young for growth and to all ages for normal vision. Here, again, animal foods excel; for good sources of vitamin A are calf and sheep liver, beef, lamb, hog, and pig liver and kidneys, and chicken liver. The B vitamin family includes thiamine, riboflavin, and niacin. These are the most

generally known and best understood B vitamins. Thiamine promotes growth, stimulates appetite, aids assimilation, and is essential for normal functioning of nerve tissue. Pork is an excellent source, as is meat juice or broth. In fact, liver, fresh meat, bacon, fish, and oysters are also good sources of thiamine. Riboflavin is the growth-promoting member of the vitamin B family. A deficiency of this factor causes stunted growth and premature aging. Veal and beef liver, beef kidney, lamb liver, pork liver, and pork kidney are all rich in riboflavin. Beef heart, oysters, sardines, crabs, ham, bacon, chicken, fish, lamb, and beef are also meat sources of this vitamin. Scientists tell us that 25 per cent of the budget spent on meats furnishes about 30 per cent of riboflavin requirement.

Niacin or nicotinic acid plays an important part in building body tissue. It is found abundantly in pork, beef, veal, and lamb liver; in pork and beef kidney; pork and beef heart; and pork, veal, chicken, beef, and lamb.

Few foods contain a real wealth of B vitamins, but in a varied diet many foods contribute some and so build an adequate supply. However, one-fourth pound of liver or one-half pound of veal, pork, or beef per day is said to furnish the daily niacin requirement.

The first vitamin separated from food was vitamin C, also called ascorbic acid or the antiscorbutic vitamin. Tissues throughout the body cannot keep in good condition without this vitamin. It is required daily because the body does not store much. A deficiency of vitamin C causes scurvy. All the familiar citrus fruits are bountiful sources of this vitamin. Tomatoes and tomato juice, canned or fresh; fresh strawberries and cantaloupe; also cabbage, green pepper, and lettuce are other good sources.

The "sunshine vitamin," or vitamin D, is especially important to the young because it works with minerals to form straight, strong bones and sound teeth. This vitamin is formed in the body when the skin is exposed to the direct sunlight. Some of this vitamin should be consumed daily, especially through the growing period. It is also necessary for pregnant and nursing mothers. Rich sources of vitamin D are cod-liver oil, fish, egg yolk, irradiated foods, and milk. Babies and young children usually require a special vitamin D preparation or one of the fish-liver oils regularly.

The preceding information should not be considered a complete treatise on proteins, minerals, and vitamins or vitamin requirements. It is only an effort to bring the reader up-to-date quickly and to show the importance of meat as a source of supply for those elements that enable the body to use other materials and to function smoothly.

COMPOSITION OF MEAT, POULTRY AND SEAFOODS—RAW, PROCESSED AND PREPARED

(100 grams, edible portion)

(This table presents data on the proximate composition and mineral and vitamin content of the various foods prepared by food and nutrition specialists, Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture.)

Food and description	Water	Food energy	Protein	Fat	Carbohydrate		Ash	Calcium	Phosphorus	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
					Total	Fiber									
	Pct.	Cal.	Gm.	Gm.	Gm.	Gm.	Gm.	Mg.	Mg.	Mg.	I.U.	Mg.	Mg.	Mg.	Mg.
Bacon, medium fat:															
Raw, slab or sliced	20.	630	9.1	65.	1.1	0	4.3	13	108	.8	(0)	.38	.12	1.9	0
Broiled or fried, drained	13.	607	25.	55.	1.	0	6.	25	255	3.3	(0)	.48	.31	4.8	0
Bacon, canned	15.6	692	8.7	72.4	.6	0	2.7	15	94	1.4	(0)	.24	.10	1.5	0
Bacon, Canadian, raw	56.	231	22.1	15.	(.3)	0	6.2	13	210	3.3	(0)	.91	.25	5.2	0
Beef carcass, raw:															
Side including kidney fat:															
Thin	66.	207	18.8	14.	0.	0	1.0	11	170	2.8	(0)	.08	.17	4.5	0
Medium fat	60.	273	17.5	22.	0.	0	.9	10	150	2.6	(0)	.08	.16	4.2	0
Fat	55.	322	16.3	28.	0.	0	.8	9	132	2.4	(0)	.07	.15	3.9	0
Very fat	47.	410	13.7	39.	0.	0	.7	8	94	2.1	(0)	.06	.12	3.3	0
Medium fat carcass, trimmed to retail	63.	240	18.2	18.	0.	0	.9	11	161	2.7	(0)	.08	.16	4.4	0
Beef cuts, medium fat:															
Chuck:															
Raw	65.	224	18.6	16.	0.	0	.9	11	167	2.8	(0)	.08	.17	4.5	0
Cooked	51.	309	26.	22.	0.	0	.7	11	117	3.1	(0)[1]	.05[1]	.20[1]	4.1	0
Flank:															
Raw	61.	247	19.9	18.	0.	0	.9	12	186	3.0	(0)	.09	.18	4.8	0
Cooked	51.	314	25.	23.	0.	0	.6	11	117	3.0	(0)[1]	.05[1]	.20[1]	4.1	0

Hamburger:															
Raw	55.	321	16.	28.	0.	0	.8	9	128	2.4	(0)	.07	.14	3.8	0
Cooked	47.	364	22.	30.	0.	0	1.1	9	158	2.8	(0)	.08	.19	4.8	0
Lean. See Round.															
Porterhouse:															
Raw	58.	296	16.4	25.	0.	0	.8	10	134	2.5	(0)	.07	.15	3.9	0
Cooked	49.	342	23.	27.	0.	0	1.1	11	170	3.0	(0)	.06	.18	4.7	0
Rib roast:															
Raw	59.	282	17.4	23.	0.	0	.8	10	149	2.6	(0)	.07	.15	4.2	0
Cooked	51.	319	24.	24.	0.	0	1.2	10	185	3.0	(0)	.06	.18	4.3	0
Round:															
Raw	69.	182	19.5	11.	0.	0	1.0	11	180	2.9	(0)	.08	.17	4.7	0
Cooked	59.	233	27.	13.	0.	0	1.3	11	224	3.4	(0)	.08	.22	5.5	0
Rump:															
Raw	55.	322	16.2	28.	0.	0	0.8	9	131	2.4	(0)	.07	.14	3.9	0
Cooked	46.	378	21.	32.	0.	0	.5	8	85	2.5	(0) [1]	.04 [1]	.15 [1]	3.1	0
Sirloin:															
Raw	62.	254	17.3	20.	0.	0	.9	10	147	2.6	(0)	.07	.15	4.2	0
Cooked	54.	297	23.	22.	0.	0	1.1	10	175	2.9	(0)	.06	.19	4.8	0
Beef, canned:															
Corned beef hash	70.4	141	13.7	6.1	7.2	.2	2.6	26	146	1.3	Trace	.03	.14	2.9	0
Roast beef	60.	224	25.	13.	0.	0	2.	16	116	2.4	(0)	.02	.23	4.2	0
Strained (infant food)	77.9	105	17.4	3.4	0.	0	1.3	11	150	4.2	(0)	.01	.22	3.3	0
Beef, corned, boneless:															
Uncooked, medium fat	54.2	293	15.8	25.	0.	0	5.0	9	125	2.4	(0)	.03	.15	1.7	0
Canned:															
Lean	62.0	185	26.4	8.	0.	0	3.6	21	110	4.5	(0)	.02	.25	3.5	0
Medium fat	59.3	216	25.3	12.	0.	0	3.4	20	106	4.3	(0)	.02	.24	3.4	0
Fat	55.3	263	23.5	18.	0.	0	3.2	19	98	4.0	(0)	.01	.22	3.2	0
Beef, dried or chipped	47.7	203	34.3	6.3	0.	0	11.6	20	404	5.1	(0)	(.07)	(.32)	(3.8)	0

COMPOSITION OF MEAT, POULTRY AND SEAFOODS—RAW, PROCESSED AND PREPARED—*Continued*

Food and description	Water	Food energy	Protein	Fat	Carbohydrate		Ash	Calcium	Phosphorus	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
					Total	Fiber									
	Pct.	Cal.	Gm.	Gm.	Gm.	Gm.	Gm.	Mg.	Mg.	Mg.	I.U.	Mg.	Mg.	Mg.	Mg.
*Beef and vegetable stew	78.6	107	5.5	8.2	7.1	.4	.6	13	75	1.1	1,070	.05	.06	1.5	6
Bluefish:															
Raw	74.6	124	20.5	4.0	0.	0	1.2	23	243	.6	—	(.12)	(.09)	1.9	—
Cooked, baked	69.2	155	27.4	4.2	0.	0	1.9	23	293	.7	—	.12	.11	2.2	—
Cooked, fried	60.8	205	22.7	9.8	4.7	0	2.0	19	243	.6	—	.11	.11	2.1	—
Clams, long and round:															
Raw, meat only	80.3	81	12.8	1.4	3.4	—	2.1	(96)	(139)	(7.0)	110	.10	.18	(1.6)	—
Canned, solids and liquid	86.7	51	7.9	1.0	2.1	—	2.3	87	125	6.3	(80)	(.05)	.10	1.1	—
Cod:															
Raw	82.6	74	16.5	.4	0.	0	1.2	10	194	.4	0	.06	.09	2.2	2
Dried	12.3	375	81.8	2.8	0.	0	7.0	(50)	891	3.6	0	.08	.45	10.9	(0)
Crabs, Atlantic and Pacific, hard-shell:															
Raw	80.0	86	16.1	1.6	.6	—	1.7	(39)	(160)	(.8)	—	.14	.06	2.7	—
Canned or cooked, meat only	77.2	104	16.9	2.9	1.3	—	1.7	45	182	.9	—	(.05)	(.06)	(2.5)	—
Croaker, raw	77.4	96	17.8	2.2	0.	0	1.3	—	—	—	—	.16	.06	(1.8)	—
Eels, raw	71.6	162	18.6	9.1	0.	0	1.0	18	202	.7	1,800	.28	.37	1.4	—
Flounder, summer and winter, raw	82.7	68	14.9	.5	0.	0	1.3	61	195	.8	—	.06	.05	1.7	—
Frog legs, raw	81.9	73	16.4	.3	0.	0	1.1	18	147	1.1	0	.14	.25	1.2	—

Haddock:															
Raw	80.7	79	18.2	.1	0.	0	1.4	23	197	.7	—	.05	.08	2.4	—
Cooked, fried	66.9	158	18.7	5.5	7.0	—	1.9	18	182	.6	—	.04	.09	2.6	—
Halibut:															
Raw	75.4	126	18.6	5.2	0.	0	1.0	13	211	0.7	440	0.07	0.06	9.2	—
Cooked, broiled	64.2	182	26.2	7.8	0.	0	1.9	14	267	.8	—	.06	.07	10.5	—
Heart:															
Beef, lean, raw	77.6	108	16.9	3.7	.7	0	1.1	9	203	4.6	30	.58	.89	7.8	6
Calf, canned, strained (infant food)	82.7	81	13.4	2.5	.2	0	1.2	12	150	3.6	—	.06	.82	4.5	—
Chicken, raw	69.6	157	20.5	7.0	1.6	0	1.3	23	142	1.7	30	.12	.91	5.2	6
Pork, raw	76.8	117	16.9	4.8	.4	0	1.1	35	132	2.7	30	.43	1.24	6.0	6
Herring, Atlantic, raw	67.2	191	18.3	12.5	0.	0	2.7	—	256	1.1	110	.02	.15	3.4	—
Herring, lake, raw	74.0	140	18.5	6.8	0.	0	1.1	12	152	.5	(100)	.09	.09	3.1	—
Herring, Pacific, raw	79.6	94	16.6	2.6	0.	0	1.3	—	—	—	100	.02	.22	(2.2)	—
Herring, smoked, kippered	61.0	211	22.2	12.9	0.	0	4.0	66	254	(1.4)	0	Trace	.28	(2.9)	—
Kidneys, raw:															
Beef	74.9	141	15.0	8.1	.9	0	1.1	9	221	7.9	1,150	.37	2.55	6.4	13
Pork	77.1	114	16.3	4.6	.8	0	1.2	11	246	8.0	130	.58	1.74	9.8	13
Sheep	77.8	105	16.6	3.3	1.0	0	1.3	13	237	9.2	(1,150)	.51	2.42	7.4	13
Lamb:															
Carcass or side, raw:															
Thin	66.3	206	17.1	14.8	0.	0	.9	10	191	2.6	(0)	.15	.21	4.9	0
Medium fat	55.8	317	15.7	27.7	0.	0	.8	9	157	2.4	(0)	.14	.20	4.5	0
Fat	46.2	414	13.0	39.8	0.	0	.7	8	93	2.0	(0)	.12	.16	3.8	0

Food and description	Water	Food energy	Protein	Fat	Carbohydrate		Ash	Calcium	Phosphorus	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
					Total	Fiber									
	Pct.	Cal.	Gm.	Gm.	Gm.	Gm.	Gm.	Mg.	Mg.	Mg.	I.U.	Mg.	Mg.	Mg.	Mg.
Lamb (*Cont.*):															
Retail items,[1] medium fat:															
Rib chop:															
Raw	51.9	356	14.9	32.4	0.	0	.8	9	138	2.2	(0)	.13	.18	4.3	0
Cooked	40.	418	24.	35.	0.	0	1.2	11	200	3.0	(0)	.14	.26	5.6	0
Shoulder roast (wholesale 3-rib):															
Raw	58.3	295	15.6	25.3	0.	0	.8	9	155	2.3	(0)	.14	.19	4.5	0
Cooked	50.	342	21.	28.	0.	0	1.0	9	188	2.6	(0)	.12	.22	4.6	0
Leg roast (wholesale leg):															
Raw	63.7	235	18.0	17.5	0.	0	.9	10	213	2.7	(0)	.16	.22	5.2	0
Cooked	56.	274	24.	19.	0.	0	1.1	10	257	3.1	(0)	.14	.25	5.1	0
Lard	0.	902	0.	100.	0.	0	0	0	0	0	0	0	0	0	0
Liver:															
Beef:															
Raw	69.7	136	19.7	3.2	6.0	0	1.4	7	358	6.6	43,900	.26	3.33	13.7	31
Cooked	57.2	208	23.6	7.7	9.7	0	1.8	8	486	7.8	53,500	.26	3.96	14.8	31
Calf, raw	70.8	141	19.0	4.9	4.0	0	1.3	6	343	10.6	22,500	.21	3.12	16.1	36
Chicken, raw	69.6	141	22.1	4.0	2.6	0	1.7	16	240	7.4	32,200	.20	2.46	11.8	20
Pork, raw	72.3	134	19.7	4.8	1.7	0	1.5	10	362	18.0	14,200	.40	2.98	16.7	23
Sheep or lamb, raw	70.8	136	21.0	3.9	2.9	0	1.4	8	364	12.6	50,500	.40	3.28	16.9	33
Liver, canned, strained (infant food)	77.8	108	16.0	3.9	1.0	0	1.3	24	278	7.1	19,200	.04	2.14	6.4	—
Liver sausage. See Sausage.															

Liverwurst. See Sausage, liver.															
Lobster:															
Raw	79.2	88	16.2	1.9	.5	0	2.2	61	184	.6	—	(.13)	.06	(1.9)	—
Canned	77.2	92	18.4	1.3	.4	0	2.7	65	192	.8	—	(.03)	.07	(2.2)	—
Mackerel:															
Raw, common Atlantic	68.1	188	18.7	12.	0.	0	1.2	5	239	1.0	(450)	.15	.35	8.4	—
Canned, solids and liquid: [3]															
Atlantic	66.0	182	19.3	11.1	0.	0	3.2	185	274	2.1	430	.06	.21	5.8	—
Pacific	66.4	180	21.1	10.0	0.	0	2.5	260	288	2.2	30	.03	.33	8.8	—
Oysters, meat only, raw	80.5	84	9.8	2.1	5.6	—	2.0	94	143	5.6	320	.15	.20	1.2	—
*Oyster stew:															
1 part oysters to 3 parts milk by volume	82.6	91	5.3	5.4	5.3	—	1.4	117	110	1.5	280	.06	.18	.4	—
1 part oysters to 1 part milk by volume	79.9	102	6.9	5.5	5.9	—	1.8	109	122	2.9	340	.09	.19	.7	—
Pork, fresh:															
Packer's carcass, side, raw:															
Thin	50.	376	14.1	35.	0.	0	.8	8	151	2.1	(0)	.69	.16	3.7	0
Medium	42.	457	11.9	45.	0.	0	.6	7	117	1.8	(0)	.58	.14	3.1	0
Fat	35.	538	9.8	55.	0.	0	.5	6	84	1.5	(0)	.48	.12	2.6	0
Retail items,[1] medium fat:															
Ham:															
Raw	53.	344	15.2	31.	0.	0	.8	9	168	2.3	(0)	.74	.18	4.0	0
Cooked	42.	400	24.	33.	0.	0	1.2	11	238	3.1	(0)	.53	.24	4.7	0
Loin or chops:															
Raw	58.00	296	16.4	25.	0.	0	.9	10	186	2.5	(0)	.80	.19	4.3	0
Cooked	50.	333	23.	26.	0.	0	1.2	11	235	3.0	(0)	.83	.24	5.0	0
Miscellaneous lean cuts, raw	52.	357	14.5	32.7	0.	0	.8	8	157	2.2	(0)	.70	.17	3.8	0

COMPOSITION OF MEAT, POULTRY AND SEAFOODS—RAW, PROCESSED AND PREPARED—*Continued*

Food and description	Water	Food energy	Protein	Fat	Carbohydrate		Ash	Calcium	Phosphorus	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
					Total	Fiber									
	Pct.	Cal.	Gm.	Gm.	Gm.	Gm.	Gm.	Mg.	Mg.	Mg.	I.U.	Mg.	Mg.	Mg.	Mg.
Pork, cured:															
Ham, smoked,[1] medium fat:															
Raw	42.	389	16.9	35.	(.3)	0	5.4	10	136	2.5	(0)	.70	.19	4.0	0
Cooked	39.	397	23.	33.	(.4)	0	5.4	10	166	2.9	(0)	.54	.21	4.2	0
Luncheon meat:															
Boiled ham	47.8	302	22.8	22.7	0.	0	6.7	9	92	2.7	(0)	1.01	.26	5.1	0
Canned, spiced	55.2	289	14.9	24.3	1.5	.2	4.1	9	161	2.2	(0)	.32	.22	2.8	0
Salt pork, fat, raw	8.	783	3.9	85.	0.	(0)	3.5	Trace	Trace	.6	(0)	(.18)	(.04)	(.9)	0
Sausage, pork links or bulk, raw. See Sausage, pork.															
Salmon:															
Raw, Pacific (Chinook or King)	63.4	223	17.4	16.5	0.	0	1.0	—	(289)	(.9)	310	.10	.23	7.2	9
Cooked, Pacific, broiled or baked	64.5	170	28.0	5.6	.2	0	1.7	—	(417)	(1.2)	—	.10	.28	8.1	—
Canned, solids and liquid (incl. bones):															
Chinook or King	64.7	203	19.7	13.2	0.	0	2.4	154[1]	289	0.9	230	0.03	0.14	7.3	(0)
Chum	70.8	139	21.5	5.2	0.	0	2.6	249[1]	352	.7	60	.02	.16	7.1	(0)
Coho or silver	67.6	166	21.1	8.4	0.	0	1.7	232[1]	254	.9	80	.03	.18	7.4	(0)
Pink or humpback	70.0	143	20.5	6.2	0.	0	2.6	187[1]	286	.8	70	.03	.18	8.0	(0)
Sockeye or red	67.2	173	20.2	9.6	0.	0	3.0	259[1]	344	1.2	230	.04	.16	7.3	(0)
Sausage:															
Bologna	62.4	221	14.8	15.9	3.6	—	3.3	(9)	(112)	2.2	(0)	.18	.19	2.7	0

Frankfurter:															
Raw	60.0	257	14.2	20.5	2.7	—	2.7	8	100	1.5	(0)	.18	.19	2.8	0
Cooked	62.	248	14.	20.	2.	—	2.	6	49	1.2	(0)	.16	.18	2.5	0
Liver, liverwurst	59.0	263	16.7	20.6	1.5	—	2.2	9	238	5.4	5,750	.17	1.12	4.6	(0)
Pork, links or bulk, raw	41.9	450	10.8	44.8	0.	0	2.1	6	100	1.6	(0)	.43	.17	2.3	0
Pork, bulk, canned	55.4	299	15.4	25.9	0.	0	3.3	9	166	2.3	(0)	.20	.24	3.0	0
Vienna sausage, canned	64.2	215	15.8	16.4	0.	0	3.6	9	170	2.4	(0)	.10	.12	3.1	0
Scallops, raw (edible muscle)	80.3	78	14.8	.1	3.4	0	1.4	26	208	1.8	0	(.04)	.10	1.4	—
Shad or American shad, raw	70.2	168	18.7	9.8	0.	0	1.4	—	260	.5	—	(.15)	.24	(8.4)	—
Shrimp, canned:															
Dry pack or drained solids of wet pack	66.2	127	26.8	1.4	—	—	5.8	115	263	3.1	60	.01	.03	2.2	(0)
Wet pack, solids and liquid	75.6	89	18.7	.9	.3	—	4.5	59	152	1.8	60	.01	.03	1.4	(0)
Soups, canned: [2]															
Beef:															
Condensed	83.2	80	4.8	2.7	8.9	.2	.4	12	50	.3	—	—	—	—	—
Ready-to-serve	91.6	40	2.4	1.4	4.4	.1	.2	6	25	.2	—	—	—	—	—
Bouillon, broth, and consomme:															
Condensed	90.9	8	(2.)	—	(0.)	0	3.0	2	19	.9	0	0	.04	.5	0
Ready-to-serve	95.	4	(1.)	—	(0.)	0	1.5	1	10	.4	0	0	.02	.3	0
Chicken:															
Condensed	87.2	60	2.7	1.9	7.9	.3	.3	15	15	.3	—	.02	.11	1.2	—
Ready-to-serve	93.6	30	1.4	1.0	3.8	.1	.2	8	8	.2	—	.01	.05	.6	—
Strained (infant food)	87.4	59	3.1	2.4	5.9	.2	1.2	38	45	.2	230	.02	.10	.4	Trace
Clam chowder:															
Condensed	81.7	67	3.5	1.9	9.7	.3	3.2	27	60	2.8	—	—	—	—	—
Ready-to-serve	90.8	34	1.8	.9	4.9	.2	1.6	14	30	1.4	—	—	—	—	—

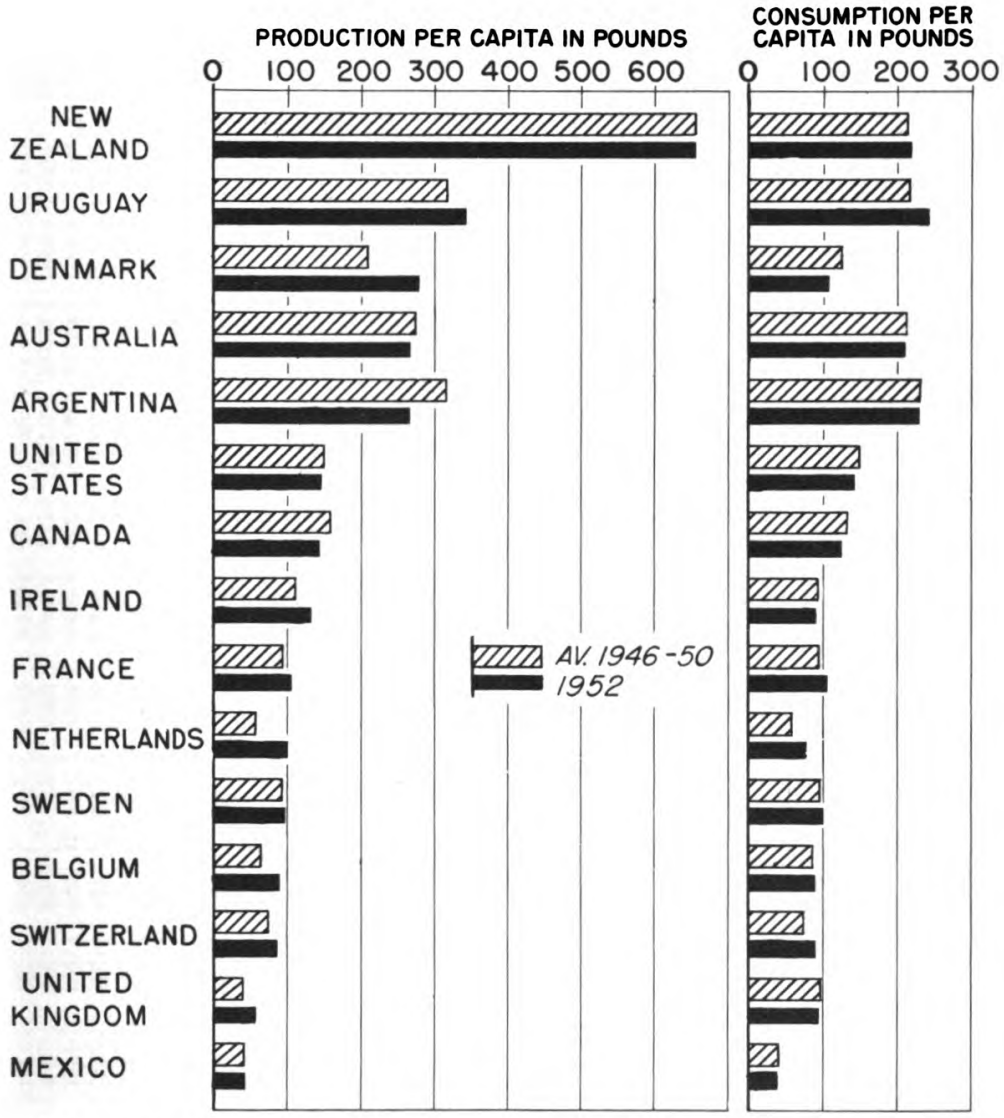
Food and description	Water	Food energy	Protein	Fat	Carbohydrate		Ash	Calcium	Phosphorus	Iron	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
					Total	Fiber									
	Pct.	Cal.	Gm.	Gm.	Gm.	Gm.	Gm.	Mg.	Mg.	Mg.	I.U.	Mg.	Mg.	Mg.	Mg.
Swordfish:															
Raw	75.8	118	19.2	4.0	0.	0	1.3	19	195	.9	1,580	.05	.05	9.1	—
Cooked, broiled	64.8	178	27.4	6.8	0.	0	1.7	20	251	1.1	2,300	.05	.06	10.3	(0)
Turkey, medium fat, raw	58.3	268	20.1	20.2	0.	0	1.0	23	320	3.8	Trace	.09	.14	8.0	(0)
Veal:															
Carcass or side excluding kidney fat, raw:															
Thin	71.	156	19.7	8.	0.	0	1.0	11	201	3.0	(0)	.14	.26	6.6	0
Medium fat	68.	190	19.1	12.	0.	0	1.0	11	193	2.9	(0)	.14	.25	6.4	0
Fat	65.	223	18.5	16.	0.	0	.9	11	185	2.8	(0)	.14	.25	6.2	0
Retail items [1] medium fat:															
Cutlet, boned (wholesale round):															
Raw	70.	164	19.5	9.	0.	0	1.0	11	200	2.9	(0)	0.14	0.26	6.5	0
Cooked	60.	219	28.	11.	0.	0	1.4	12	258	3.5	(0) [2]	.08 [2]	.28 [2]	6.1	0
Shoulder roast, boned (wholesale chuck):															
Raw	70.	173	19.4	10.	0.	0	1.0	11	199	2.9	(0)	.14	.26	6.5	0
Cooked	59.	228	28.	12.	0.	0	1.4	12	258	3.6	(0)	.13	.31	7.9	0
Stew meat, without bone:															
Raw	64.	231	18.3	17.	0.	0	.9	11	182	2.7	(0)	.13	.24	6.1	0
Cooked	53.	296	25.	21.	0.	0	.8	11	124	3.0	(0) [3]	.05 [3]	.24 [3]	4.6	0

Adapted from Agriculture Handbook No. 8, Composition of Foods, U. S. Department of Agriculture, Washington 25, D. C.
Note: Asterisk indicates that values are calculated from a recipe; parentheses indicate imputed value.

[1] Data assume cut to be prepared by braising or pot roasting. Use of proportionate quantity of drippings would add approximately 50 per cent more thiamine and niacin and 25 per cent more riboflavin.

[2] Data assume cut to be prepared by braising or pot roasting. Use of proportionate quantity of drippings would add approximately 50 per cent more thiamine and niacin and 25 per cent more riboflavin.

MEAT*: PRODUCTION AND CONSUMPTION PER CAPITA
SPECIFIED COUNTRIES



*CARCAS MEAT - EXCLUDES OFFAL, LARD, RABBIT AND POULTRY MEAT

MEAT PRODUCTION AND CONSUMPTION FROM TOTAL UNITED STATES SLAUGHTER, 1899 TO DATE [1]

Year	Beef			Veal			Lamb and mutton			Pork (excluding lard)			All meats			Lard			Population July 1 [3]
	Production	Consumption		Production	Consumption		Production	Consumption		Production	Consumption		Production	Consumption		Production	Consumption [2]		
		Total	Per capita		Total	Per capita		Total	Per capita		Total	Per capita		Total	Per capita		Total	Per capita	
	Mil. lb.	Mil. lb.	Lb.	Mil. lb.	Mil. lb.	Lb.	Mil. lb.	Mil. lb.	Lb.	Mil. lb.	Mil. lb.	Lb.	Mil. lb.	Mil. lb.	Lb.	Mil. lb.	Mil. lb.	Lb.	Mil.
1899	5,522	5,029	67.2	387	387	5.2	487	486	6.5	6,310	5,371	71.8	12,706	11,273	150.7	1,679	954	12.8	74.8
1900	5,628	5,104	67.1	397	397	5.2	493	492	6.5	6,329	5,476	71.9	12,847	11,469	150.7	1,653	1,002	13.2	76.1
1901	5,814	5,266	67.9	422	422	5.4	548	548	7.0	6,357	5,493	70.8	13,141	11,729	151.1	1,650	997	12.8	77.6
1902	5,649	5,148	65.0	476	476	6.0	564	560	7.1	5,936	5,288	66.7	12,625	11,472	144.8	1,493	956	12.1	79.2
1903	6,240	5,711	70.9	492	492	6.1	563	560	6.9	6,067	5,498	68.2	13,362	12,261	152.1	1,529	952	11.8	80.6
1904	6,176	5,719	69.6	491	491	6.0	538	537	6.5	6,387	5,803	70.6	13,592	12,550	152.7	1,638	1,031	12.5	82.2
1905	6,504	5,973	71.3	556	556	6.6	530	529	6.3	6,629	5,945	71.0	14,219	13,003	155.2	1,742	991	11.8	83.8
1906	6,537	6,087	71.3	598	598	7.0	543	542	6.3	6,793	6,065	71.0	14,471	13,292	155.6	1,735	1,002	11.7	85.4
1907	6,544	6,141	70.6	626	626	7.2	553	551	6.3	7,059	6,443	74.1	14,782	13,761	158.2	1,790	1,146	13.2	87.0
1908	6,662	6,393	72.1	637	637	7.2	559	557	6.3	7,535	6,898	77.7	15,393	14,485	163.3	1,911	1,277	14.4	88.7
1909	6,915	6,713	73.1	660	660	7.2	608	606	6.6	6,557	6,065	66.1	14,740	14,044	153.0	1,628	1,127	12.3	91.8
1910	6,647	6,508	69.5	667	667	7.1	597	596	6.4	6,087	5,756	61.4	13,998	13,527	144.4	1,553	1,156	12.3	93.7
1911	6,549	6,426	67.5	666	666	7.0	693	690	7.2	6,961	6,482	68.1	14,869	14,264	149.8	1,747	1,138	12.0	95.2
1912	6,234	6,153	63.6	662	662	6.9	735	729	7.6	6,822	6,357	65.7	14,453	13,901	143.8	1,658	1,102	11.4	96.7
1913	6,182	6,157	62.5	608	609	6.2	706	701	7.1	6,979	6,501	65.9	14,475	13,968	141.7	1,653	1,073	10.9	98.6
1914	6,017	6,144	61.1	569	572	5.7	693	708	7.1	6,824	6,453	64.2	14,103	13,877	138.1	1,554	1,090	10.8	100.5
1915	6,075	5,668	55.6	590	591	5.8	605	612	6.0	7,616	6,690	65.6	14,886	13,561	133.0	1,689	1,198	11.7	102.0
1916	6,460	6,003	58.1	655	656	6.3	585	595	5.7	8,207	7,037	68.1	15,907	14,291	138.2	1,706	1,228	11.9	103.4
1917	7,239	6,687	63.7	744	745	7.1	463	463	4.4	7,055	6,093	58.1	15,501	13,988	133.3	1,451	1,091	10.4	104.9
1918	7,726	7,167	67.6	760	761	7.2	506	499	4.7	8,349	6,384	60.2	17,341	14,811	139.7	1,899	1,291	12.2	106.0
1919	6,756	6,462	60.7	819	824	7.8	590	598	5.6	8,477	6,712	63.0	16,642	14,596	137.1	1,920	1,174	11.0	106.5
1920	6,306	6,293	58.3	842	852	7.9	538	578	5.4	7,648	6,766	62.6	15,334	14,489	134.2	1,958	1,319	12.2	108.0
1921	6,022	6,024	54.7	820	824	7.5	639	662	6.0	7,697	7,029	63.9	15,178	14,539	132.1	2,108	1,217	11.1	110.1
1922	6,588	6,503	58.3	852	858	7.7	553	565	5.1	8,145	7,236	64.8	16,138	15,162	135.9	2,302	1,503	13.5	111.6
1923	6,721	6,671	58.8	916	919	8.1	588	592	5.2	9,483	8,310	73.2	17,708	16,492	145.3	2,718	1,643	14.5	113.5
1924	6,877	6,786	58.7	972	977	8.4	597	596	5.2	9,149	8,451	73.0	17,595	16,810	145.3	2,660	1,663	14.4	115.7
1925	6,878	6,888	58.6	989	993	8.5	603	605	5.1	8,128	7,734	65.8	16,598	16,220	138.0	2,153	1,453	12.4	117.5
1926	7,089	7,074	59.4	955	959	8.0	639	637	5.4	7,966	7,529	63.3	16,649	16,199	136.1	2,206	1,465	12.3	119.0
1927	6,395	6,484	53.7	867	875	7.3	629	631	5.2	8,430	8,058	66.8	16,321	16,048	133.0	2,263	1,541	12.8	120.7
1928	5,771	5,872	48.1	773	781	6.4	663	662	5.4	9,041	8,545	69.9	16,248	15,860	129.8	2,458	1,626	13.3	122.2
1929	5,871	6,048	49.0	761	766	6.2	682	686	5.5	8,833	8,484	68.7	16,147	15,984	129.4	2,461	1,598	12.9	123.5
1930	5,917	6,021	48.2	792	794	6.4	825	824	6.6	8,482	8,246	66.1	16,016	15,885	127.3	2,227	1,584	12.7	124.8
1931	6,009	6,025	47.9	823	824	6.6	885	886	7.0	8,739	8,477	67.4	16,456	16,212	128.9	2,307	1,706	13.6	125.8

1932	5,789	5,830	46.0	822	822	6.5	884	882	7.0	8,923	8,825	69.7	16,418	16,359	129.2	2,380	1,814	14.3	126.6
1933 [4]	6,440	6,469	50.8	891	891	7.0	852	849	6.7	9,234	8,885	69.8	17,417	17,094	134.3	2,475	1,772	13.9	127.3
1934 [4]	8,345	8,066	63.0	1,246	1,182	9.2	851	798	6.2	8,397	8,141	63.6	18,839	18,187	142.0	2,091	1,648	12.9	128.1
1935 [4]	6,608	6,770	52.5	1,023	1,087	8.4	877	923	7.2	5,919	6,155	47.7	14,427	14,935	115.8	1,276	1,226	9.5	129.0
1936 [4]	7,358	7,742	59.7	1,075	1,075	8.3	854	849	6.5	7,474	7,061	54.4	16,761	16,727	128.9	1,679	1,449	11.2	129.8
1937	6,798	7,107	54.4	1,108	1,108	8.5	852	857	6.6	6,951	7,185	55.0	15,709	16,257	124.5	1,431	1,361	10.4	130.6
1938	6,908	7,058	53.6	994	994	7.6	897	894	6.8	7,680	7,554	57.4	16,479	16,500	125.4	1,728	1,440	10.9	131.6
1939	7,011	7,159	53.9	991	991	7.5	872	869	6.5	8,660	8,474	63.9	17,534	17,493	131.8	2,037	1,671	12.6	132.7
1940	7,175	7,257	54.2	981	981	7.3	876	873	6.5	10,044	9,701	72.4	19,076	18,812	140.4	2,288	1,924	14.4	134.0
1941	8,082	8,021	60.0	1,036	1,005	7.5	923	901	6.7	9,528	9,007	67.4	19,569	18,934	141.6	2,228	1,879	14.1	133.7
1942	8,843	8,049	60.4	1,151	1,084	8.1	1,042	950	7.1	10,876	8,368	62.8	21,912	18,451	138.4	2,401	1,759	13.2	133.3
1943	8,571	6,860	52.5	1,167	1,059	8.1	1,104	830	6.4	13,640	10,172	77.9	24,482	18,921	144.9	2,865	1,820	13.9	130.6
1944	9,112	7,146	54.9	1,738	1,594	12.2	1,024	857	6.6	13,304	10,230	78.5	25,178	19,827	152.2	3,054	1,824	14.0	130.3
1945	10,276	7,665	58.6	1,664	1,536	11.7	1,054	943	7.2	10,697	8,598	65.7	23,691	18,742	143.2	2,066	1,622	12.4	130.9
1946	9,373	8,533	60.8	1,443	1,382	9.8	968	923	6.6	11,150	10,506	74.9	22,934	21,344	152.1	2,136	1,667	11.9	140.3
1947	10,432	9,916	68.6	1,605	1,545	10.7	799	762	5.2	10,502	9,919	68.6	23,338	22,142	153.1	2,402	1,904	13.2	144.6
1948	9,075	9,153	62.2	1,423	1,384	9.4	747	733	5.0	10,055	9,840	66.8	21,300	21,110	143.4	2,321	1,972	13.4	147.2
1949	9,439	9,420	63.0	1,334	1,311	8.8	603	606	4.0	10,286	9,993	66.8	21,662	21,330	142.6	2,534	1,898	12.6	149.6
1950	9,538	9,517	62.5	1,230	1,206	7.9	597	596	3.9	10,714	10,361	68.1	22,079	21,680	142.4	2,631	2,097	13.8	152.3
1951	8,843	8,462	55.2	1,061	1,005	6.6	522	518	3.4	11,483	10,818	70.6	21,909	20,803	135.8	2,864	2,113	13.8	153.2
1952 [5]	9,628	9,483	61.0	1,170	1,101	7.1	648	640	4.1	11,589	11,181	71.9	23,035	22,405	144.1	2,903	2,099	13.5	155.4

[1] Beginning 1940, data exclude meat produced in Hawaii and Virgin Islands. Beginning 1941, consumption is civilian only. Units are carcass weight equivalent; exclude edible offals.

[2] Computed from unrounded numbers. Includes lard entering into manufactured products. Excludes military use.

[3] Beginning 1909, adjusted for underenumeration.

[4] Includes production and consumption from Government emergency programs, data for which can be found in *The Livestock and Meat Situation* for February, 1949, page 23.

[5] Preliminary.

SOURCE: Bureau of Agricultural Economics, U. S. Department of Agriculture.

MEAT [1]

PER CAPITA CONSUMPTION, BY TYPES, IN SPECIFIED COUNTRIES IN 1952, WITH COMPARISON

Country	Average 1946-50				1952 [2]			
	Beef and veal	Pork (excl lard)	Mutton and lamb	Total	Beef and veal	Pork (excl lard)	Mutton and lamb	Total
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Canada	70	55	4 [3]	134	52	62	2 [3]	123
United States	73	69	5	147	68	72	4	144
Belgium	35	33	2 [4]	85	41	42	1 [4]	91
Denmark	48	70	2 [5]	126	36	68	1 [5]	108
Finland	24	28	3 [5]	57	26	29	3 [5]	60
France	49	36	6 [5]	94	53	42	6 [5]	105
Ireland	37	44	13	94	35	42	13	90
Netherlands	27	27	1 [5]	58	34	40	1 [5]	78
Norway	28	24	10 [5]	64	29	27	11 [5]	69
Sweden	41	50	1 [5]	96	40	55	1 [5]	100
Switzerland	42	34	1 [5]	79	44	44	1 [5]	91
United Kingdom	43	17	24 [3]	99	33	37	22 [3]	96
Argentina	194	19	19	232	202	14	14	230
Brazil [6]	40	10	1 [7]	52	45	11	1 [7]	57
Chile	49	10	14 [7]	73	42	10	11 [7]	64
Uruguay	142	6	70	218	174	17	52	243
Union of South Africa	56	7 [7]	15	78	52	7 [7]	15	74
Australia	116	22	69 [3]	212	123	17	64 [3]	208
New Zealand [8]	107	33	71	211	115	28	77	220

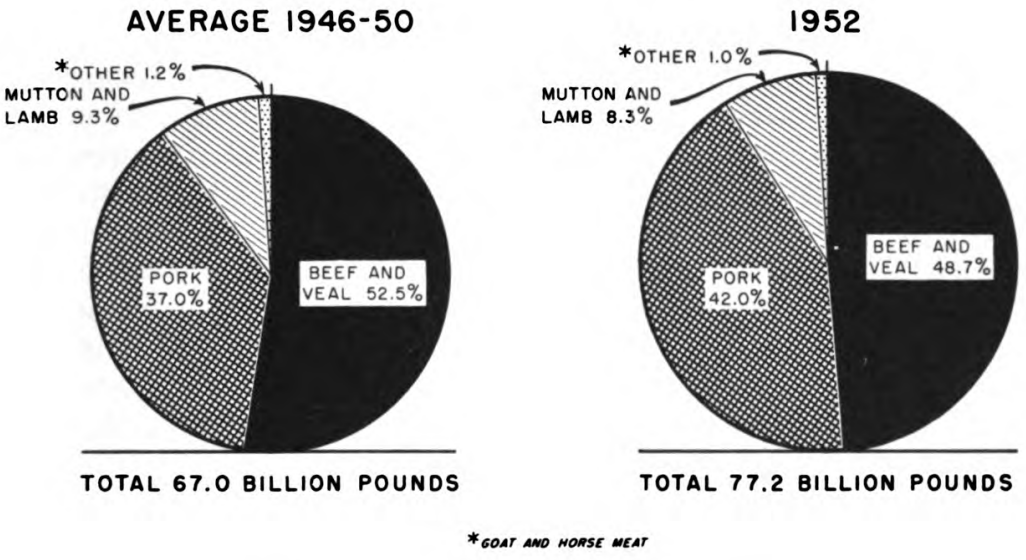
[1] Carcass meat—excludes edible offal, lard, rabbit, and poultry meat. [2] Preliminary. [3] Total includes canned meat. [4] Total includes goat, horse, and canned meat. [5] Total includes goat and horse meat. [6] Excludes farm production and consumption. [7] Includes goat meat. [8] Year ended September 30.

Foreign Agricultural Service. Prepared or estimated from official statistics of foreign governments, reports of United States Foreign Service officers, and other information,—August 1953.

MODERN MEAT CONSUMPTION

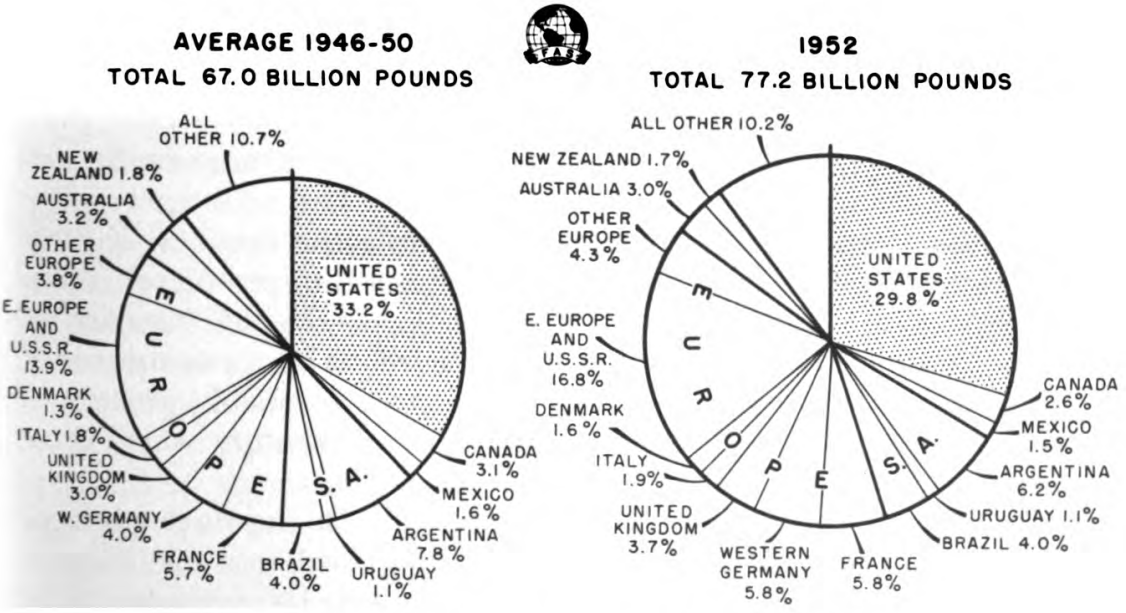
It is generally assumed that earlier civilizations ate more meat than the later ones; however, there are no statistics of any value on this point. As a population of a country increases and agriculture develops, less meat is eaten. The decrease in meat consumption

MEAT PRODUCTION IN SPECIFIED COUNTRIES AND PER CENT OF WORLD TOTAL
AVERAGE 1946-50 AND 1952



SOURCE: U. S. DEPARTMENT OF AGRICULTURE

WORLD MEAT PRODUCTION BY TYPES
AVERAGE 1946-50 AND 1952



SOURCE: U. S. DEPARTMENT OF AGRICULTURE

is realized more fully if we look back to the feasting at Christmas in Tudor England when, according to *Life Magazine,* dinner began around noon and often went on for eight or nine hours. At the end of the hall, seated upon a dais, the lord presided over the feast, surrounded by his family and numerous guests and attendants. One by one, to the blast of trumpets, the tremendous platters of food were borne into the hall. The greatest fanfare was reserved for the wild boar's head, the stuffed swan, and the roasted peacock, fully dressed with spreading tail and gilded beak. All about the table were urns of fruit, steaming pies, wassail bowls of ale floating with toasted apples, and confections in the intricate forms of ships or castles. Jesters, musicians, and mummers in fantastic masks rollicked about the table, dogs barked and snapped at morsels, and a "Lord of Misrule" appointed to govern for the day entertained the assembly with nonsensical edicts and clownish commands. But most of the guests were too busy devouring the food, with the aid of their fingers, to pay much attention to the festive confusion and frolicking.

In the not too long past we have further evidence of the decrease in meat consumption by reading a menu of the 1890's, when game was a food for epicures. Imagine sitting down to an elaborate and sophisticated dinner where the course of soup and fish were followed by "releves," six or more in number, among them turkey *á la Toulouse,* saddle of venison with currant jelly, and stewed terrapin *á la Maryland.* And after that came a number of cold, ornamented dishes; then the entrees and hors d'oeuvres.

The second main course offered canvasback ducks, pheasants, partridges, and grouse, with ten vegetables. And finally came 15 desserts and coffee. Such was the culinary tradition of the inns, taverns, and hotels of our larger cities during the nineteenth century.

However, there are indications that, while the number of meat eaters increases steadily, the average consumption per person tends to decrease. It is also generally accepted that, as the standard of comfort rises, the diet becomes more varied. The consumption of meat in the United States, for example, was probably greater in the nineteenth century than in the twentieth century when there is a larger variety of food available.

During the past five decades ending in 1950 the domestic consumption, per person, of meat, excluding lard, was as follows: 1901–1910, 153 pounds per person; 1911–1920, 140 pounds; 1921–

1930, 136 pounds; 1931–1940, 131 pounds; 1941–1950, 147 pounds. During 1951 the consumption was 138 pounds per person, but in 1952 it was around 145 pounds per person. This represents a daily consumption per person of approximately 3 ounces each of beef and pork and a half an ounce of the other meats, or a total of slightly more than 6 ounces.

Consumer purchase studies made by the United States Department of Agriculture tend to show that city people eat more meat per person than rural farm and non-farm rural people who have the same incomes. Farmers, however, eat more meat than non-farm rural people. Within each income class, city families consume more beef and veal per person than either farmers or non-farm rural people. City folks generally eat more lamb than rural people who have the same income.

Game on the Table

Game is the term applied to animals and birds which live free in the fields, woods, and mountains in a state of nature and are good to eat. Game is one of the delicacies of the dinner table; it is healthful, savory, tasty, and easily digested. The share of food contributed by game to the average table is at present relatively small, and it is surprising how few persons in this country have ever eaten game. Most American families, in fact, have never even tasted it.

If game meats were used more commonly and a taste for venison and wildfowl cultivated, there could be more variety in the diet with practically no increase in cost.

The flesh of game, when young, is generally tender, contains less fat than poultry, is of a fine, though strong flavor, and is easy of digestion. Game meat is usually of dark color, ruffed grouse and quail being exceptions, and is usually cooked rare.

Climatic conditions, food, and cover all bear a definite relation to the quality and taste of game meat. Many small game species survive and thrive in densely populated farm areas.

Farms on which the crop rotation includes wheat, corn, buckwheat, lespedeza, soybeans, and similar seed-producers are especially attractive to upland game birds and rabbits. In addition, rabbits are fond of almost any green vegetation, especially that grown in vegetable gardens.

Age affects the flavor and texture of the meat from wild animals. It is impossible to state the age at which an animal will be best

for meat, but everyone knows that meat from old animals is tougher than that from young ones. The flesh of very young animals, however, frequently lacks flavor and is watery. An old animal, if fat and healthy, is better than a young one in poor condition.

Venison has the same chemical composition as beef but is not nearly so fat as meat from well-fed cattle. A lean venison roast before cooking contains, on the average, 75 per cent water, 20 per cent protein, and 2 per cent fat; a lean beef rump, 65 to 70 per cent water, 20 to 23 per cent protein, and 5 to 14 per cent fat; and a lean leg of mutton, 67 per cent water, 19 per cent protein, and 13 per cent fat. Venison, like beef and other common meats, is thoroughly digestible, whatever the method of cooking.

Nutrition Tests. In experiments conducted at the technological laboratory of the United States Fish and Wildlife Service at College Park, Md., proximate analyses and vitamin assays were made on the comparative nutritive value of muskrat meat and beef.

PROXIMATE ANALYSES OF EDIBLE PORTIONS OF ROASTED MEATS

Meat Tested	Dry Matter %	Protein %	Fat %	Mineral matter %	Calories per 100 grams
Muskrat	32.1	27.1	4.2	1.4	150
Beef.....	42.4	30.3	10.8	1.3	220

The two meats are quite similar in composition except that the muskrat meat contained less than half as much fat as the beef. The muskrat meat contained .16 milligram of thiamine and .21 milligram of riboflavin per 100 grams, as compared with values reported for beef of .11 milligram of thiamine and .20 milligram of riboflavin per 100 grams. The proximate analyses and vitamin values, of course, vary somewhat from sample to sample.

Feeding tests to determine the comparative nutritive value of these two meats showed that muskrat meat had an apparent digestibility of 93.4 per cent and that of beef 95.9 per cent. Both meats were easily digested.

Proximate analyses and vitamin assays were made on cooked samples of domestic rabbit, raccoon, opossum, muskrat and beaver meats. The results are shown in the following tables:

PROXIMATE ANALYSES OF COOKED SAMPLES OF GAME ANIMALS

Meat tested	Moisture %	Protein %	Fat %	Mineral matter %
Beaver:				
Boiled	56.2	29.2	13.7	0.9
Roasted	64.2	30.0	5.1	1.2
Muskrat, roasted	67.1	29.7	3.8	1.5
	66.4	26.7	5.3	1.4
	70.2	25.2	3.3	1.2
Oppossum, roasted	58.3	30.2	10.2	2.3
Rabbit, roasted	57.2	24.9	13.8	1.4
	60.8	32.4	6.2	1.3
	60.2	33.6	5.4	1.5
Raccoon, roasted	54.3	29.2	14.5	1.5

VITAMIN ASSAYS ON COOKED SAMPLES OF GAME ANIMALS

Meat tested	Micrograms per 100 grams of cooked meat	
	Thiamine	Riboflavin
Beaver:		
Baked	76	380
Boiled	60	270
Cottontail rabbit, fried	160	230
Muskrat, roasted	160	210
Opossum:		
Broiled	150	2,580
Roasted	100	375
Rabbit:		
Baked	105	105
Roasted	104	116
Stewed	50	77
Rabbit kidney, broiled	400	2,300
Rabbit liver, roasted	200	2,300–2,500
Raccoon, roasted	575–600	525
Raccoon liver, broiled	200	1,840

The North American wild turkey, as its name implies, is truly American. This is the bird with which the Pilgrim Fathers inaugurated the first Thanksgiving. It differs from its domestic kin in shape, size, and flavor. It has a very deep breast, longer legs, and the dark meat is as delicious as the light. Rare now in native

habitat, it is as difficult and sporting a game bird to hunt as the woodcock. The flavor of the meat is not so different from domestic turkey. It does not possess as gamey a taste as pheasant or quail. Some prefer it to the domestic species. The flesh, however, differs from other game birds in that it is juicy—not dry.

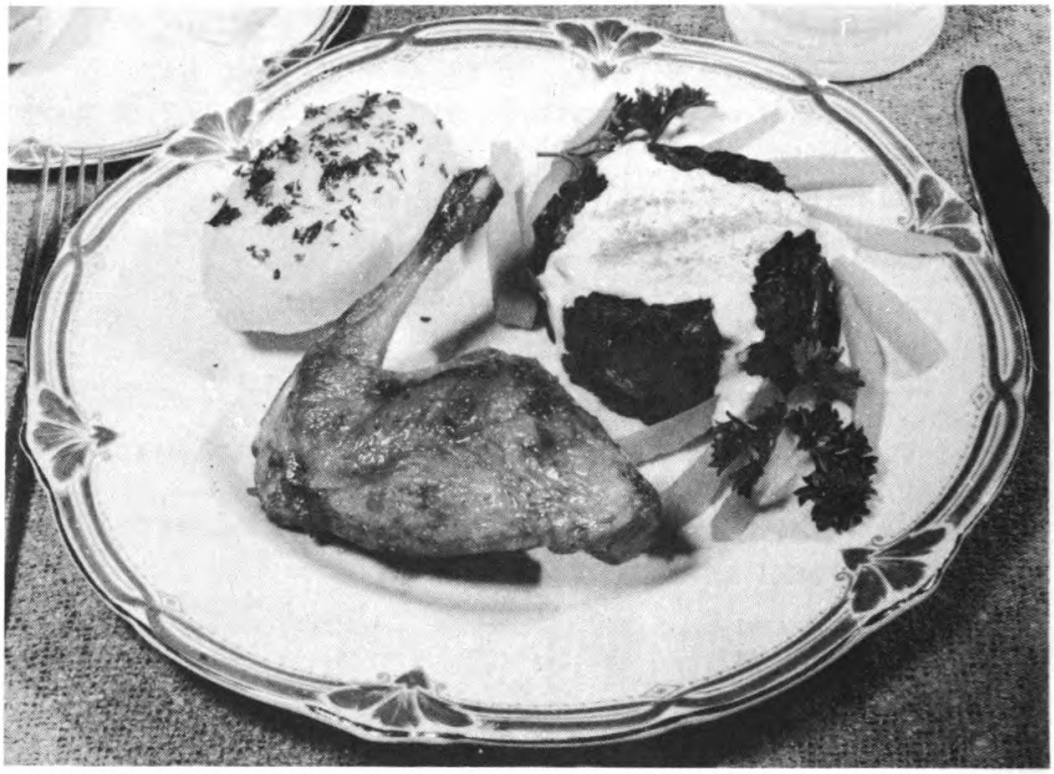


FIG. 8. Fried or broiled domestic rabbit is delicious any time and can be served throughout the year.

DOMESTIC RABBIT

Although domestic rabbit has no place in the category of game meats, it is nevertheless rapidly assuming a position of considerable importance as a "new meat."

Home dwellers with available space for a small back-yard rabbitry have discovered that, for the time, labor, and expense involved, the easy-to-raise domestic rabbit, which is ready for table use in 90 days, pays a handsome dividend in good eating. Each doe can produce 4 litters, of 7 to 8 each, in a year. Fryer rabbits at two months will dress about 2 pounds, and slightly more than 77 per cent of the product is edible. Older and heavier rabbits—those beyond the fryer age—are delicious in a fricassee or roast. Meat markets in

many sections of the country can supply rabbit meat for families unable to raise their own.

In food value, the domestic rabbit ranks with poultry and other lean table meats as a protein builder of muscle and body. It is fine-grained, delicately flavored, and highly nutritious. Chemical analysis shows it to be composed of 19.7 to 21 per cent protein, 8.5 to 16.0 per cent fat, 62 to 70 per cent water, and 1 per cent mineral salts. The edible part of the carcass is about 82 to 85 per cent of the dressed weight. This percentage is much higher in the dressed carcasses of mature rabbits weighing 3 to 7 pounds than it is in those of younger rabbits weighing from to 2 to 2¾ pounds.

Some housewives still have a prejudice against the use of rabbit meat, because they confuse the domestic grain-fed rabbit with the wild animal, such as the cottontail and the hare. This may be due in part to the unattractive way in which the carcasses of wild rabbits, shot by hunters, have been offered to housewives.

The meat of the domestic rabbit is all white, like the breast of chicken; and in both color and flavor it is entirely different from wild rabbit. Unlike the wild rabbit, the domestic rabbit is available the year round, the same as chicken, and is as palatable and nutritious in hot weather as in cold.

POULTRY

The term poultry in its general sense includes all domestic birds bred and raised for human food. It implies turkeys, geese, ducks, guinea fowl, and pigeons, just as well as chickens.

The meat of well-fattened chickens of young or medium age has about the same nutritive value as beef, but it is considered easier to digest and therefore suitable for invalids and convalescents.

Squabs, the young of pigeons, were recognized as delicious and nourishing food hundreds of years before Christ. They supply choice, tender meat for home consumption. They sometimes substitute for game birds. The flesh of a squab contains a larger proportion of soluble protein and a smaller proportion of connective tissue than pigeon flesh; it is a good source of liquid protoplasm and vitamin G and is relatively rich in phosphorus.. Squab meat has a fine texture and a distinctive, delicious flavor, is tender, and easily digested. A squab is desirable for an individual serving.

Today the precedent of the traditional turkey at Thanksgiving, Christmas, and other special occasions has given way to serving this choice bird at all times of the year, and it is becoming less and less

expensive. Meatier turkeys are being developed so that a small (9 to 12 lb.) turkey will serve a family of five generously at two meals. Any day in any year may now be turkey day.

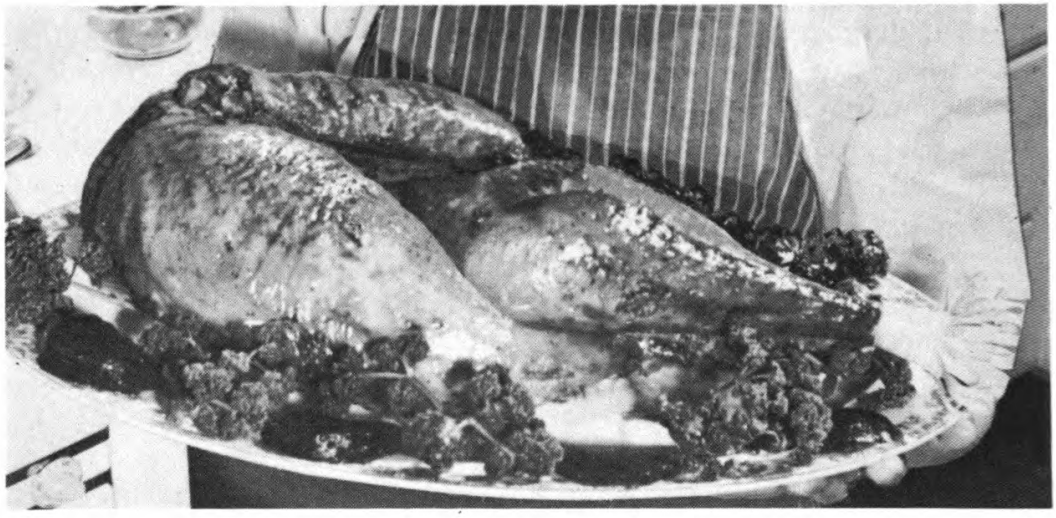


FIG. 9. Any day in the year can be turkey day. They are sold live, dressed, or ready-to-cook, in various sizes and parts.

Duck and goose differ considerably from both turkey and chicken in shape, in proportion of dark and light meat, and in fat content. Raising ducks and geese has been practiced in Europe for centuries. It began in the United States with the arrival of the early settlers. The increase in human population and the development of cities created a demand for duck and goose meat, especially on the part of the foreign-born population, and therefore duck and goose production has expanded considerably from its early beginning. The dark meat of ducks and geese provides the consumers with a change from the white meat of chicken and turkeys. Ducks and geese, because they are quite fat, are efficient self-basters, and no extra basting is necessary during roasting. Both goose and duck fat are desirable for pan-frying or sautéing all kinds of food.

Guineas, like game fowl that have been a rarity of the past, are becoming more popular and the demand is increasing due to present meat prices. The distinct dark color and wild flavor of this small, compact bird is being appreciated more. The breast of the guinea hen is still a great delicacy. It is the meatiest part of the bird and, since the hen has the plumpest breast, the guinea hen is most prized for cooking.

Guinea fowl, are also used as a substitute for game birds such as grouse, partridge, and pheasant. Many hotels and restaurants in the

large cities serve prime young guineas at banquets and club dinners as a special delicacy. When well-cooked, guineas are attractive in appearance, although darker than chicken, turkey, or squab. Young guinea is tender and of especially fine flavor resembling that of wild game birds. Like other old fowl, old guineas are likely to be tough and rather dry.

Finally there are the giblets, edible viscera of both domestic and wildfowl—livers, hearts, gizzards—which give rise to a number of preparations. Before it was possible to buy cut-up chicken these various parts of poultry, considered valuable in foreign countries, were generally discarded or used chopped in gravies. The head of a chicken is in Europe left on the bird when it is cooked, as the brain is accounted a tidbit; blanched cocks' combs and wattles are rated by French cooks as a delicacy worthy of preparation as a separate dish, and especially desirable for garnishing; and the feet skinned and dressed are used for broths.

Cooked giblets may be chopped, heated in gravy, baked in dressing, and folded into omelets. They are high in nutritive value. Giblets cooked together with necks, backs, and wing tips make an appetizing soup or stew. Livers sautéed in butter or bacon fat, with or without onions or mushrooms, served on toast are excellent.

Fish

Fish is one of the keys to successful meal planning. There are so many kinds of fish—and so many ways to serve it. Fish is a boon to the budget and in these days of quick freezing, refrigeration, and fast transportation, it is easy to get and easy to prepare. It may be caught or bought fresh, frozen, or canned. Few people realize how many varieties of fish are available on the market. In fact, only about a dozen or so species, namely the pilchard of California, sardine, salmon, tuna, mackerel, sea herring, menhaden, shrimp, oysters, haddock, rosefish, crabs, cod, and flounders, make up 80 per cent of the total catch.

Many fish are on the list of under-utilized species that could be caught in greater quantity and so supply a considerable poundage of needed food. Conservative in its eating habits, the public tends to ask for only the staple and well-known kinds. Many fish discarded in the United States have been on European menus for years.

Inland fish in particular could be used more widely. The neglected carp is so abundant throughout the Middle West that sportsmen consider it a nuisance. Properly handled and prepared, it is an excellent food, considered a delicacy by Europeans.

FIG. 10. Fish are rich in nutritive value since they are excellent sources of very digestible proteins.

Buffalo fish are also available in quantity, as are the sweet-meated, though bony, suckers. The burbot, a wholesome food dish, is present in quantities in the Great Lakes during most of the year.

Among ocean species, we are likely to see more frequently in the markets such varieties as skates, sharks, anglerfish, puffers, sea robins, mussels, and squids. Now the public, faced with high meat prices, is more willing to try the new species seen in sea food markets. The once-neglected sea mussel is now enjoying some popularity on the Atlantic Coast.

Still more or less in the field of marine curiosities as far as the general public is concerned are squids, periwinkles, conches, and sea urchins. However, Americans of recent European or Asiatic origin regard these creatures as delicacies. Although comparatively few Americans have ever tasted squid, the canning of this marine mollusk is an old and well-established industry in California, and before World War II more squid than crab was being canned in the United States.

The meat of our largest marine mammal, the whale, has been quite popular recently. The meat is dark red and tastes something like beef. It is eaten in many countries. Its flesh is wholesome when properly handled.

Fish are rich in nutritive value since they are excellent sources of digestible proteins, and contain essential minerals, vitamins, and fats. Government nutrition charts recommend that all of us eat at least one serving of fish, meat, or fowl every day. Fish may be eaten interchangeably with meat or fowl because most varieties contain as much food value as meat—in many cases more. A good policy for health insurance is to follow the Government's suggestion and eat more fish. Once a week is good—twice is better.

III

FOOD PLANNING

This book is about home meat economies. Remember! It is written primarily for the family, to help solve the meat problem and to amplify the meat supply. Meat is entitled to a high-ranking spot in our present-day culinary setup.

Every homemaker strives to serve enjoyable meals and keep the family well nourished. It is a difficult task; and to maintain a healthy and happy family one must practice thrift and save time and energy wherever possible.

To complete the food program, then, it is important to tell something about food planning to provide meals that contain vitamins and other nutrients in quantities which different individuals need. Your family will agree that food intelligently selected, carefully prepared, and properly served tastes better.

A Ready-Made Food Plan

Even though meat has a top rating as food, it is not a perfect food. There is no single food that supplies all the body requirements. So when you eat a variety of food you are pretty sure of getting a well-rounded assortment of the nutrients and vitamins you need. To be sure your family is well fed you must provide each important kind of food—and enough of it. This requires wise planning.

A helpful guide for weekly shopping and meal planning has been developed by the nutritionists of the United States Department of Agriculture. They tell us at the beginning that a food fact worth knowing is: When families in this country are poorly fed, the foods they neglect are most often milk and milk products, and vegetables and fruits—especially the leafy, green, and yellow vegetables and citrus fruits. Watch for these in planning.

In the nutrition plan given on page 48, foods are in groups ac-

cording to their major contributions of nutrients, as well as their place in the meal. Amounts to provide for adequate diets are shown in pounds and quarts of food for a week.

You can use the allowance plan on page 49 in several ways. It can serve as a shopping guide, as it stands to show the approximate amount of food needed for each member of the family. Or you can compare it to kinds and quantities of food you regularly use, just to make sure that you are not short in any important kind.

If you have a garden and put up food for the winter, the food plan can help as a general guide to amounts of foods that the family will use.

FIG. 11. Ground beef broiled on toast, with or without onion rings, is a favorite with the youngsters and the oldsters as well.

HOW TO FIGURE THE FAMILY'S NEEDS

In using the food plan, figure weekly amounts of the food groups that will fit your family. The figures in the columns preceding pounds or quarts are arranged to show food quantities according to age, sex, and how active the individual is. Where a range is given: For children, the first quantity is for the youngest age. For adults, the first quantity is for the less active. The most active adults do really heavy work or take strenuous exercise. For pregnant and

nursing women, the first quantity is for pregnant women and the second for nursing women.

No figures are given for children under one year because they are often breast fed or have formulas or other food prepared especially for them.

Guided by these ranges, you can estimate the quantity needed for each person in the family. Use judgment in doing this. If a child is having a spurt of growing, he may need the amount of food usually suggested for children a year or two older.

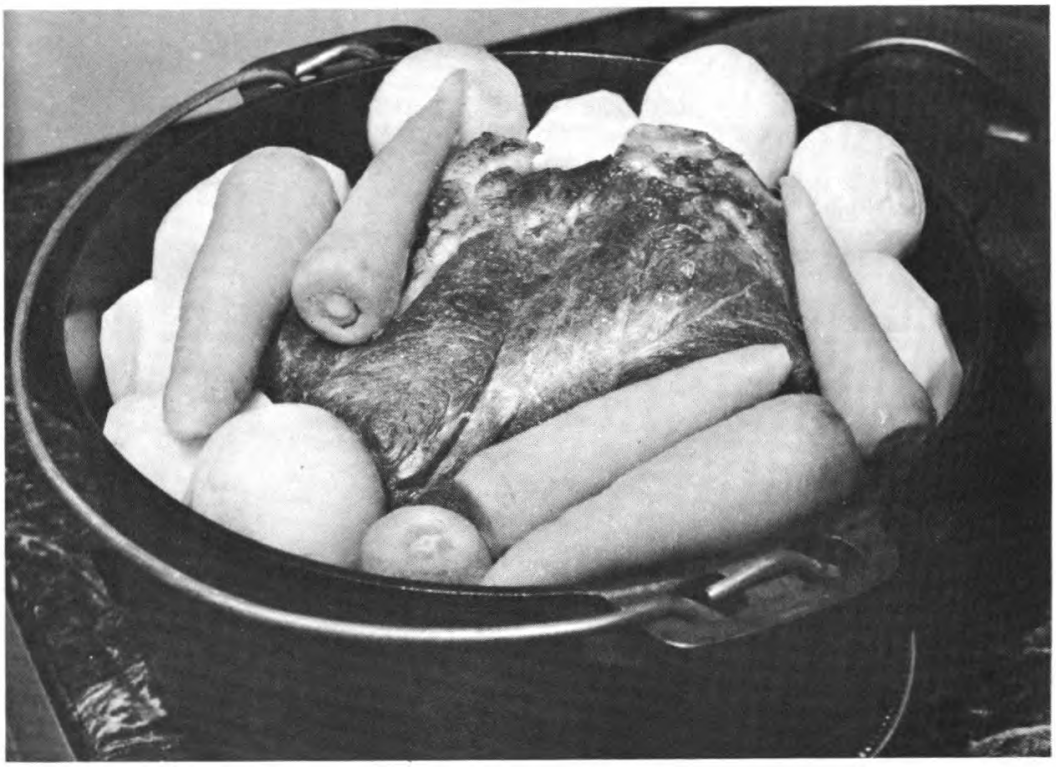


FIG. 12. Pot roast of beef—chuck, rump or round—with potatoes, onions and carrots, is a thrifty and savory dish.

As you add up the amount of each kind of food your family members need in a week, write the figure in the column provided in the food plan sheet. This is your guide, to use as it stands or to compare with amounts you have been using.

FOOD AND ECONOMY

Quantities in the food plan can be purchased for about the same money that the average family in this country spends for food. This

assumes that you will choose moderate-priced foods, or mix some cheaper foods with more expensive ones. On the other hand, if you want to reduce food costs and still eat well and in some instances much better, then preserve some food. You can save money by purchasing meat, vegetables, and fruits in quantity and preserving them at home. Freezing is the easiest method and requires the minimum of time and energy. Other methods, principally for fruits and vegetables, are canning and preserving, and for meats, marinating, corning, brine and dry curing, and smoking. Remember that meat, poultry, fish, eggs, milk, and cheese contain the top-rating proteins and some of these protein foods are needed each day; it is an advantage to include some in each meal.

FIG. 13. Mixed grill—lamb chop, sausage cake, liver, broiled tomatoes and parsley potatoes—makes a sumptuous meal.

DAILY DIETARY NEEDS

The following table gives a rough idea of how servings from groups of familiar foods contribute toward dietary needs. These ratings, calculated by the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, are based on daily allowances of the nutrients for a moderately active man as recommended by the National Research Council.

A serving that rates 5 stars provides more than 50 per cent of the day's need for a nutrient. A 4-star serving provides about 40 per cent; 3-star serving, 30 per cent; 2-star serving, 20 per cent; and 1-star serving, 10 per cent. Smaller amounts are not shown.

A FOOD PLAN FOR GOOD NUTRITION

(QUANTITIES FOR ONE WEEK)

Kinds of food	For children 1 to 6 years	For children 7 to 12 years	For girls 13 to 20 years	For boys 13 to 20 years	For women		For men, all activities	Total suggested for your family
					All activities	Pregnant and nursing		
Leafy, green, and yellow vegetables	2–2½ pounds	2½–3 pounds	3½ pounds	3½–4 pounds	3½–4 pounds	4 pounds	3½–4 pounds	
Citrus fruits, tomatoes	2–2½ pounds	2½–3 pounds	3 pounds	3–3½ pounds	2½–3 pounds	3½–4½ pounds	2½–3½ pounds	
Potatoes, sweetpotatoes	½–1 pound	1½–2 pounds	2½ pounds	3½–4½ pounds	2–3 pounds	2–3 pounds	3–5 pounds	
Other vegetables and fruits	2 pounds	2½ pounds	3½ pounds	3½ pounds	3–4 pounds	3–3½ pounds	3–4 pounds	
Milk, cheese, ice cream (milk equivalent)	6 quarts	7 quarts	6–7 quarts [1]	7 quarts	5 quarts	7½–10½ quarts	5 quarts	
Meat, poultry, fish [2]	1–1¼ pounds	2 pounds	2½–3 pounds	3 pounds	2½–3 pounds	3 pounds	3–3½ pounds	
Eggs	6–7 eggs	7 eggs	7 eggs	7 eggs	6–7 eggs	7 eggs	6–7 eggs	
Dry beans and peas, nuts	1 ounce	2 ounces	2 ounces	4–6 ounces	2–4 ounces	2 ounces	4 ounces	
Baked goods, flour, cereals (flour equivalent) Whole-grain, enriched, or restored	1–1½ pounds	2–3 pounds	2½–3 pounds [1]	4–5 pounds	2–4 pounds	2–2½ pounds	3–7 pounds	
Fats, oils	¼ pound	½-1 pound	¾ pound	1–1½ pounds	¾-1 pound	¾ pound	1–2 pounds	
Sugar, sirups, preserves	¼–½ pound	¾ pound	1 pound	1–1½ pounds	¾-1 pound	¾ pound	1–1½ pounds	

[1] Larger quantities are for the younger girls.

[2] To meet the iron allowance needed by children 1 to 6 years, girls 13 to 20, and pregnant and nursing women, include weekly 1 large or 2 small servings of liver or other organ meats.

Daily Allowances of Nutrients for a Moderately Active Man

Kind of food	Size of serving	Protein	Calcium	Iron	Vitamin A value	B-vitamins: Thiamine	B-vitamins: Riboflavin	B-vitamins: Niacin	Vitamin C (ascorbic acid)	Food energy (in calories)
Leafy, green, yellow vegetables	½ cup			★	★★★★				★★	30
Tomatoes, tomato products	½ cup			★	★★★			★	★★★	35
Potatoes	1 medium			★		★		★	★	105
Sweetpotatoes	1 medium			★	★★★★★	★		★	★★★	165
Other vegetables	½ cup								★	40
Citrus fruits	½ cup								★★★★★	55
Other fruits	½ cup				★				★	70
Milk, cheese, ice cream	1 cup milk	★	★★★		★	★	★★			170
Meat, poultry, fish	4 ounces	★★		★★	★	★★	★	★★★		225
Eggs	1 egg	★		★	★		★			80
Dry beans and peas, nuts	¾ cup beans cooked	★★	★	★★★		★★	★	★★		215
Baked goods, flour, cereals	2 slices bread	★		★		★	★	★		130
Butter, fortified margarine	1 pat				★					50
Other fats (includes bacon, salt pork)	2 tablespoons									230
Sugar, all kinds	2 teaspoons									35
Molasses, sirups, preserves	2 tablespoons			★						115

★★★★★ More than 50 per cent of daily need.
★★★★ About 40 per cent of daily need.
★★★ About 30 per cent of daily need.
★★ About 20 per cent of daily need.
★ About 10 per cent of daily need.

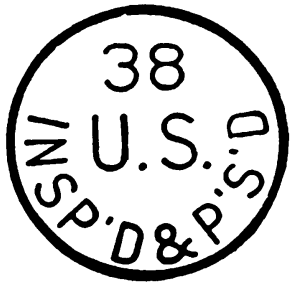
Federal Meat Inspection

The United States and the Canadian governments require meat processing establishments to maintain satisfactory cleanliness and sanitary conditions before they are granted meat inspection service.

All meat processors engaged in interstate, interprovincial, or foreign trade are required to maintain government inspection during the various stages of meat processing. However, these regulations do not prevent uninspected meat from being sold within the state or province. Of all meat and meat products consumed, about two-thirds in the United States and about one-half in Canada are federally inspected. The remainder is processed and consumed within the state or province, where it is subject only to local inspection laws. Some states have state inspection which is nearly identical to the United States Federal inspection. Some cities also have a similar inspection.

Meat inspection in both the United States and Canada is an assurance that the meat has been slaughtered, dressed, and prepared under sanitary conditions; also that it is free from disease and entirely wholesome at the time the meat was marked with the inspection stamp.

The meat inspection stamps of the United States and Canada are illustrated below.



This stamp on fresh and cured meat (and certain other meat products) shows that the meat was inspected and passed as wholesome food. The purple coloring is absolutely harmless.

This stamp printed on canned or packaged meat products shows that the contents were inspected and passed as wholesome food.

All labels or tags affixed to federally inspected meat and meat food products must be approved in the United States by the Meat Inspection Branch, United States Department of Agriculture, Washington, D. C., and in Canada by the Health of Animals Division, Dominion Department of Agriculture, Ottawa, Canada.

Meat and meat food products cannot be imported into the United States unless the country from which they are exported has comparable inspection to that of the United States. The imported product is inspected by United States Government inspectors at the port of entry. Any product found to be unfit for human food is either destroyed or refused entry. Meat products imported into Canada must be acceptable under Canadian inspection meat requirements. Both governments require an official certificate of inspection from the exporting country to accompany the meat at the time it is offered for entry.

When buying federally inspected meat or meat food products, look for the round stamps, brands, or labels showing the processing establishment number.

The fluid used to stamp the meat is made of vegetable coloring and is harmless. The imprint usually disappears when the meat is cooked. Therefore, it is not absolutely necessary to cut off the stamp before cooking the meat. Sometimes the inspection legend, in abbreviated form, is burned into smoked meats, liver and beef hearts. Labels applied to cans, tins, buckets, and cartons of federally inspected products are required to bear the statement, "U. S. Inspected and Passed by the Department of Agriculture" in the United States, and in Canada the statement "Canada Approved." The number of the meat processor or packing establishment also appears on these labels.

Kosher meat is slaughtered, examined, and given the necessary rites by the shohet or representative of the Orthodox Jewish religion. It is then marked with the Hebrew symbols. These symbols are not to be confused with the United States inspection stamp or the Canadian inspection legend, although kosher meat often carries the government inspection stamp as well as the Hebrew symbols.

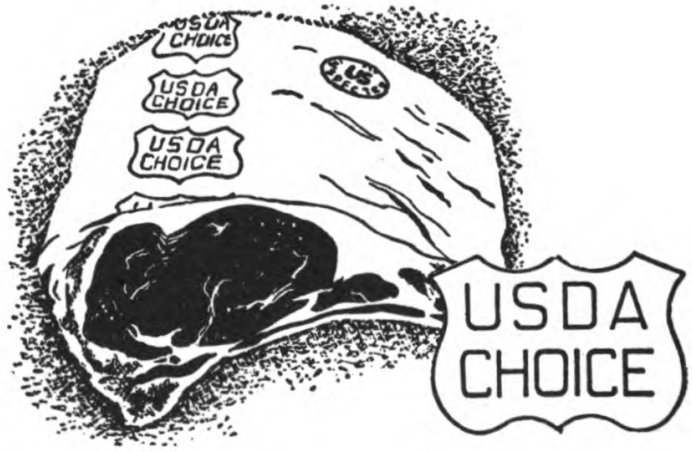
For a more detailed explanation of the Federal meat inspection system, write the Meat Inspection Branch, United States Department of Agriculture, Washington 25, D. C.

Federal Meat Grading and Stamping Service

Most consumers have decided preferences with regard to meat. Those whose incomes will permit are usually willing to pay pre-

mium prices for meat of higher quality, and those whose incomes necessitate economy in purchases desire to get the highest grade obtainable for the price paid. But the price of meat is not always an accurate indicator of quality. Unless the grade name is stamped on the product or indicated by some other method, the consumer has no way of identifying either the highest grade or the highest grade obtainable for the price paid. Then, too, most consumers are not good judges of meat.

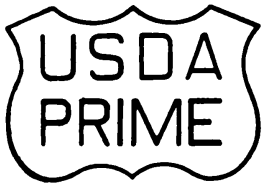
Meat possesses an unusually wide range in quality. It is graded on factors which determine its relative value to the consumer. Quality is determined by color, texture, grain, and the degree of marbling (intermingling of fat through the lean). Finish indicates the amount, color, character and distribution of fat. Conformation refers to the general build and shape of the carcass, side or cut. Its main consideration in grading is the close relationship which exists between conformation and the relative proportion of lean meat to bone. These are the principal factors that determine the grade of meat.



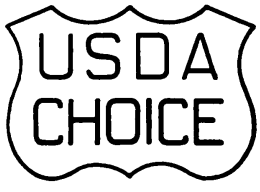
The U. S. grade stamp

The meat-grading and stamping service of the government gives consumers a means by which they can select meat with reasonable assurance that they are getting the quality or grade of meat that they want and are paying for. Government experts—men who know meat—carefully grade it while it is still at the packing plant. With a roller stamp they mark the carcass so that the grade name appears on all the principal cuts sold in the stores.

Description of the grades. Beef of each grade will provide a satisfactory dish if the meat is appropriately cooked. The degree of quality to associate with each of the grades is briefly discussed in the paragraphs that follow:



As the name implies, beef of this grade is highly acceptable and palatable. Prime grade beef is produced from young and well-fed beef-type cattle. The youth of the animal and the careful intensive feeding which it has had, combine to produce very high quality cuts of beef. Such cuts have liberal quantities of fat interspersed within the lean (marbling). These characteristics contribute greatly to the juiciness, tenderness, and flavor of the meat. Rib roasts and loin steaks of this grade are consistently tender and cuts from the round and chuck should also be highly satisfactory.



This grade is preferred by most consumers because it is of high quality but has less fat than beef of the Prime grade. More of this grade of beef is produced than of any other grade. Choice grade beef is usually available the year-round in substantial quantity. Roasts and steaks from the loin and rib are tender and juicy and other cuts, such as those from the round or chuck which are more suitable for braising and pot roasting, should be tender with a well-developed flavor.

This grade pleases thrifty homemakers who seek beef with little fat but with an acceptable degree of quality. Although cuts of this grade lack the juiciness associated with a higher degree of fatness, their relative tenderness and high proportion of lean to fat make them the preference of many people.

Beef that is graded Commercial is produced largely from older animals and usually lacks the tenderness of the higher grades. Cuts from this grade, if carefully prepared, can be made into satisfactory and economical meat dishes. (Most cuts require long, slow cooking with moist heat to make them tender and to develop the rich, full, beef flavor characteristic of mature beef.)

Some young animals produce beef of Commercial grade. Cuts from carcasses of such animals have a very thin fat covering and are practically devoid of marbling.

Beef of this grade is produced mostly from cattle somewhat advanced in age and is usually lacking in natural tenderness and juiciness. The cuts of this grade, as they appear in the retail markets, carry very little fat but provide a palatable, economical source of lean meat for pot roasting, stewing, boiling, or ground-meat dishes. For satisfactory results, long, slow cooking by moist heat is essential.

OTHER GRADES

There are also two other grades of beef—Cutter and Canner. These are ordinarily used in processed meat products and are rarely, if ever, sold as cuts in retail stores.

Government standards have been developed chiefly for the grading and standardization of beef sold at retail. The grade stamp found on all the main cuts takes much of the gambling out of buying beef. It is different from the round purple stamp used in Federal meat inspection work. The round stamp shows that the meat has been inspected and passed for food. The grading work takes place later. It is an optional service to aid in the merchandizing of meats under exact and true grade names, thus enabling the housewife, when she wants a "Good" grade roast or steak to be sure of obtaining that quality.

For more detailed explanation of Federal grading program and services offered, write the Live Stock Division, Agricultural Marketing Service, United States Department of Agriculture, Washington 25, D. C.

Lamb and veal, as well as beef, are graded by the government when the meat packer or distributor asks for the service and pays for it. At present the government is grading pork on contract orders only.

Beef is the only meat that is government graded in Canada. The grade stamp is red or blue depending on grade; it runs the full length of the carcass.

Federal meat grading service is also available in Canada to meat packers, wholesalers, and jobbers, and, as in the United States, it is not compulsory.

The two official Canadian grade names of beef are "Choice" and "Good."

Choice is the best quality of beef. It is marked with a red ribbon-like stamp. A portion of this stamp appears on practically every major retail cut. The word "Choice" does not appear, as the red color indicates the grade.

Good is the standard grade of beef and is marked with a blue ribbon-like stamp. The word "Good" does not appear, as the blue color indicates the grade. This grade is in demand with those who desire good-eating quality without undue waste or cost.

Veal in Canada is not graded or marked for the consumer, but it is for the wholesaler and the retail dealer; there are three grades: "Good," "Medium," and "Fair."

Also, pork is not marked for the retail grade, although it is classified in the wholesale market into three principal grades: "Selects," "Bacons," and "Butchers." "Selects" and "Bacons" represent the highest grades.

Federal-State Grading and Inspection of Poultry

The Voluntary Poultry Regulations of the United States Department of Agriculture offer several grading and inspection programs and services. Although they are used mostly by commercial operators, some producers having large processing operations are now operating under one or more of these programs. Poultry producers who use any of the following kinds of services must adhere to the above-mentioned regulations, as long as they are operating under them:

(1) Grading of Dressed Poultry. Under this program, Federal or Federal-State graders do the grading. Only carcasses of A quality or B quality may be individually identified by a Federal grade mark, illustrated below. The containers of such poultry may also be identified with a grade mark. If dressed poultry is of C quality, only the bulk containers may be so identified, even though the grading may have been performed on an individual bird basis.

Left to right: A Federal grade mark for ready-to-cook chickens; the Federal inspection mark; a Federal combination mark, bearing the inspection and grade marks.

(2) Grading of Ready-to-Cook Poultry. Under this program, the birds must be inspected for wholesomeness and condition by a Federal inspector, or by an inspector for some other approved agency as a prerequisite to grading. The birds are graded by a Federal or Federal-State grader. Ready-to-cook birds that have been graded and inspected, or their containers, may be identified by a Federal grade mark such as that shown above for dressed poultry. However, if such a grade mark is used, the Federal inspection mark must be used with it, or a Federal combination mark can be used when the inspection was made by a Federal inspector. If the inspection was made by an inspector from an approved agency other than the United States Department of Agriculture, some identification other than the Federal inspection mark must be used with the grade mark to show that the birds were so inspected.

(3) Inspection of Dressed Poultry for Processing as Ready-to-Cook Poultry. Under this inspection service, a Federal inspector examines dressed poultry for wholesomeness and condition while the birds are being eviscerated. The ready-to-cook birds (whole or cut up, prepared from such poultry) or the containers in which they are packed can be identified with the inspection mark.

For a more detailed explanation of the grading and inspection programs and services offered by the United States Department of Agriculture, write the Agricultural Marketing Service, United States Department of Agriculture, Washington 25, D. C.

IV

PRESLAUGHTER CONSIDERATIONS

Butchering and preserving meat and meat products on the farm constitute a major home industry. In many sections of our country, raising, slaughtering, and processing the farm pork supply is traditional. Around 13½ million hogs, almost 1½ million beef cattle and calves, and over ½ million sheep and lambs are butchered each year on the farm for home use.

This concept of meat economy should extend into the suburban and city families; because modern developments, such as unit freezers for the home, freezer locker plants, improved methods of home curing and meat preservation, not only help solve the meat problem but amplify the food supply. Home meat curing, sausage making, and canning are no longer matters of guesswork and no longer difficult projects. Practical meat economies in the home should gain popularity and become more universal because of changing economic conditions which are affecting our mode of living.

Louis Bromfield says this about raising pigs:

> You can breed the pigs and buy the corn and get on; you can raise the corn and buy the pigs and get on;
> If you buy the corn and buy the pigs to feed, you haven't a chance;
> But if you breed the pigs and raise the corn, you'll make money.

However, it is not essential to breed the pigs and raise the corn to procure better and less expensive meat. Obviously, one who does produce, process, and consume his own meat products has a decided advantage over a nonproducer for he eliminates the middlemen, thus increasing his operating margin. One would act wisely if he made himself independent of the world market insofar as his family fare is concerned, but it is quite impossible with a continuation of our standard of living to accomplish this completely. However, one

way to stabilize the family budget is to lick the meat problem. This should gain in popularity even though it requires the preservation and storage of a larger variety and a greater poundage of meat than previously. It is not even necessary to cure, smoke, and can the entire meat supply, for it is now possible to have a considerable quantity of fresh meats during the year, thanks to unit freezers for household use and freezer locker plants. Although the raising and slaughtering of meat animals on the farm is quite essential and should be extended to reduce the family meat bill, it is not, however, absolutely necessary that the suburbanite and the city dweller butcher the animals that supply the meat to be preserved and stored. Most communities have experienced butchers who will do custom butchering, and practically all refrigerator locker plants have professional butchers who slaughter and cut up the carcass.

Preparations for Butchering

The production or the procurement of the animal is only the first step in obtaining a home meat supply. If the meat requirements of the family are sufficiently large and conditions are favorable, home butchering may be a practical undertaking. Without the proper equipment or the knowledge and ability to butcher and process the meat, the result may prove costly and disappointing.

Butchering and preserving meat require considerable thought and preparation. The warm carcass of a freshly slaughtered meat animal is a highly perishable food product up to the time the meat is ready to be cooked.

Precise application to correct methods, cautious cleanliness in handling meat, and the correct tools and equipment are all important to do the job properly and successfully.

Equipment and Tools

A shed or building properly equipped for butchering, with small pens adjacent for holding the animals prior to slaughter, is, of course, an ideal structure in which to do the job. Slaughtering can be done, however, in a garage, in the basement of a house, or outdoors.

Proper means for hoisting the carcass should be provided, such as a tripod made of timbers, a tree, or a brace extending out from a building. A chain hoist, block-and-tackle, or windlass is necessary for hoisting. This equipment should be sufficiently strong to carry

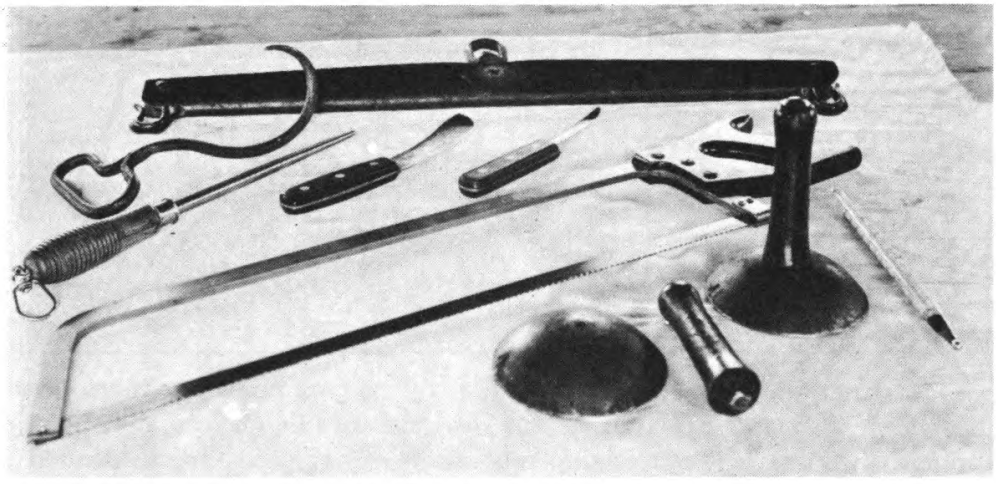


FIG. 14. Equipment for use in slaughtering and dressing hogs: Gambrel (single-tree), hook, smooth steel, skinning knife, boning knife, saw, bell-shaped hog scrapers, and thermometer.

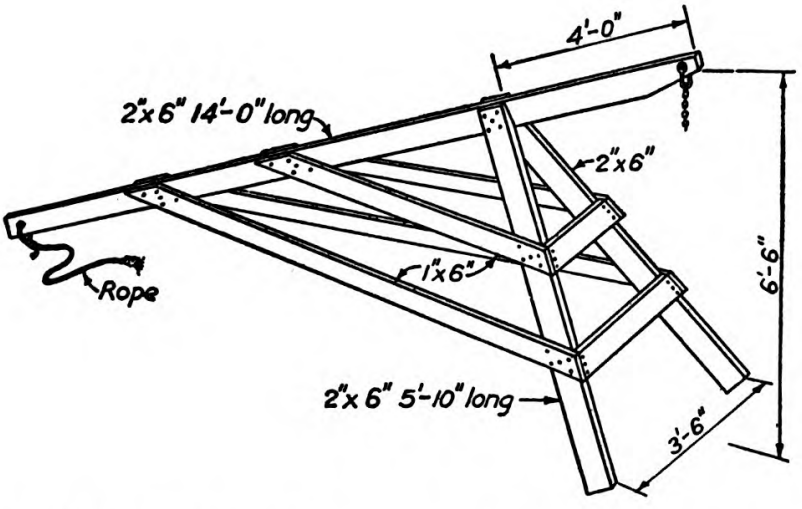


FIG. 15. "Hobbyhorse." A simple and inexpensive means for lifting, as well as suspending, the hog carcass.

the weight easily. Hooks, gambrel sticks, or a single tree will suffice for hogs and sheep, and a neck yolk makes a satisfactory tree for hanging light beef carcasses, whereas for heavy cattle a double tree should be used. A pair of ordinary clevises should be used to fasten the tendons in the case of a beef carcass to prevent it from slipping off the tree.

In the case of hogs, a water-heating arrangement with scalding vat and a substantial table are basic requirements; however, a hog

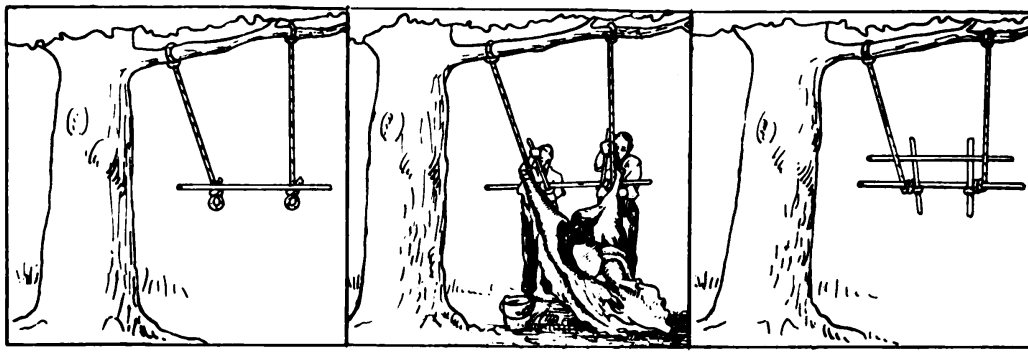


FIG. 16. Homemade beef hoist. A simple method of hoisting a beef carcass is illustrated in these sketches. A fork or rake handle or gas pipe is slipped through incisions between tendon and shank bone; ropes are suspended from tree limb or other support (wide apart at top) to height of hocks below. To free ends of rope are tied short sticks, as 2-foot pieces of broom handle or equally strong material. These are placed inside the shanks and are used as levers for winding up ropes around fork or rake handle, as shown. Two men wind up the rope around pipe or handle. When beef is at right height, another pipe or handle is laid across between ropes and ends of sticks to prevent unwinding. As the beef is raised the legs are spread farther and farther, as desired.

can be scalded in a metal or wooden barrel. A thermometer, hand hooks, bell-shaped hog scrapers, meat saw, cleaver, knives, whetstone, and a steel are needed. If a cleaver or meat saw is not available, a sharp hatchet and a wood saw will suffice. A sledge or an ax can be used to stun an animal.

For slaughtering lambs, a low bench or box is required. If many lambs are to be killed, a V-shaped trough of proper height is most convenient.

Some heavy and light rope, plenty of buckets, tubs, clean cloths, and an abundance of fresh water should be on hand for butchering any animal.

A good set of knives is required, but they need not be elaborate or expensive. Certain tools are essential and others are desirable. Most useful of all is the curved 6-inch skinning knife. It may be used for sticking hogs, raising the gambrel tendons, shaving and dressing the carcass, and cutting and trimming the meat. It is also the best knife for skinning cattle and lambs. Once the user becomes accustomed to its shape, the curved knife will be found to cut more easily and smoothly than the straight butcher knife. A narrow-bladed boning knife, the narrower the better, is needed in preparing boneless roasts and in boning meat that is to be made into sausage or canned. A butcher knife, whetstone, steel, cleaver, bell scrapers, meat saw, meat hooks, and a stunning ax or hammer are also required.

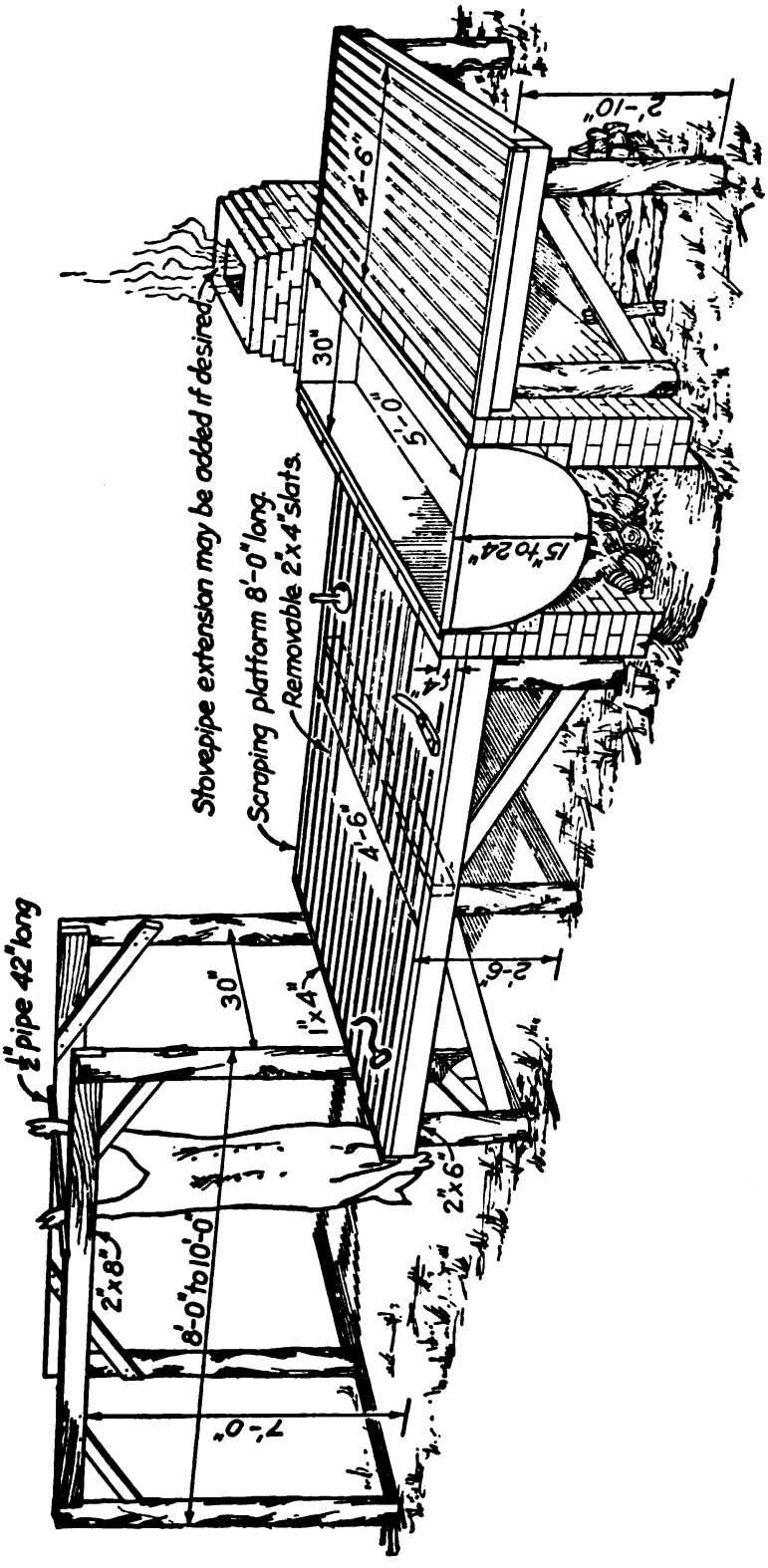


FIG. 17. Equipment for scalding, scraping and suspending hog carcasses. The essential part of this unit is a metal tank, bathtub, or half of a steel drum so supported on masonry or earth walls as to form a firebox beneath. Pieces of ½-inch pipe, 3½ feet long, used as gambrels will permit carcass to be rolled easily along the dressing rails. The length of the table and rails can be adjusted to the needs.

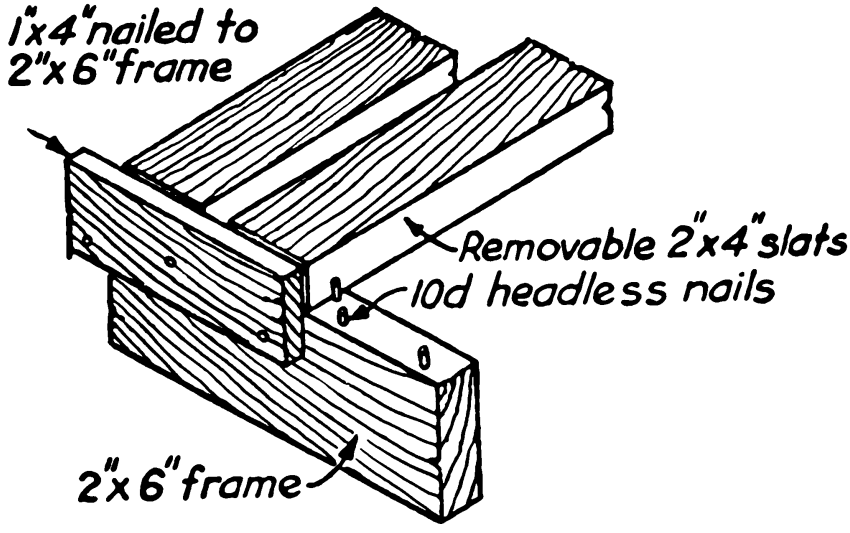


FIG. 18. Method of holding 2- by 4-inch removable slats. It is a good plan to have the vat and most of the wooden parts mounted so that they can be removed, cleaned, and stored when not in use.

Additional "tools" useful in preparing meat for curing and smoking are a salinometer; meat pump; meat-curing thermometer; and meat needle for sewing rolled or folded cuts; curing barrels; a meat grinder; sausage stuffer; lard containers; pans and bowls for pieces of meat and meat trimmings, scrapple, and headcheese; and a smokehouse.

Plan well ahead of the time for butchering and organize a convenient, well-equipped place for doing the work. Then, by conscientiously following the methods given in this book, you will proceed easily and more safely toward better processed meat.

It is quite important to have a good set of knives and the proper gadgets to keep them sharp. The knives must be designed for the work they are supposed to do. They must keep their cutting edges if used for the right purpose and given the proper care. A good knife should be well balanced, and the blade should be neither too stiff nor too limber to be manipulated with ease in performing the job intended. A high carbon content of steel indicates a good quality of knife; but unfortunately one cannot tell by looking at a knife whether it has a high or low carbon content in the steel blade. The best plan is to purchase knives made by well-known manufacturers.

Grinding. When offered for sale, knives are not usually sharpened for immediate use. All of them require honing, and some need further grinding before they are honed. When it is necessary to

have extra thinness on the cutting edge of the blade, a sandstone can be used. The stone should be water-cooled when in use so as to prevent heating the steel blade. The idea in grinding is to develop a bevel of about one-fourth of an inch from the edge on both sides of the knife to be used in sticking and skinning. The stone should be run at a right angle against the edge or with the edge of the blade. Care should be taken not to cut or scar the blade further back than the required bevel. After grinding, the knife should be honed.

Honing. Special whetstones made for this operation are obtainable. Either water or oil, as the case may be, is used to develop the proper abrasive surface. Perhaps you have seen such a stone used by the barber to hone a razor or by the shoemaker to sharpen his leather-cutting knives. Such a stone is generally set in a heavy wooden base to keep it stationary. To hone a knife, grasp the handle in the right hand. Place the heel of the knife blade on the left end of the stone. Tilt the blade up high enough so that the bevel lies flat on the stone. Place the fingers of the left hand on the blade near the back edge and put pressure on the entire blade. Draw the knife with a sweeping motion to the right, completely across and inward against the cutting edge of the blade. Then turn the knife over in the palm of the hand by a twist of the thumb and an index finger and draw the blade across the stone in the opposite direction. Always draw the knife across the stone against the edge of the blade to prevent forming a wire edge. To put the edge in perfect condition and complete the sharpening process, the knife must be steeled.

Steeling. There are steels of various kinds adapted for definite use. The mirror steel is the one best adapted for butchering, as it puts a razor-sharp edge on the blade. One 10 or 12 inches long is quite satisfactory. In his book, *How to Carve Meat, Game and Poultry,* M. O. Cullen, meat carving expert of the National Livestock and Meat Board, states:

> Steeling requires definite technique, for anything but the right way will produce the exact reverse of the end desired, which is to straighten the edge of the blade.
>
> The detailed instructions for steeling, difficult to describe in words, are much simpler to follow if the directions are acted out with the implements in the hand.
>
> Hold the steel, thumb over the handle, firmly in the left hand and on a level with the elbow. The steel should be pointed slightly away from the body and upward at about a 45-degree angle. The carving knife is held in the right hand, almost at a perpendicular. In the next steps the knife actually comes in contact with the steel, and the angle at which this takes place is the important thing to watch. The angle should be somewhere between 25 and 35 degrees. No one, of course, expects you to re-

view the basic principles of geometry in order to measure out the angle to the *n*th degree. A fair approximation of the tilt of the knife will ordinarily serve the purpose of laying the blade against the steel so that the edge can be straightened rather than rounded. This is the tapering process which takes place when a blade is trued up.

Then, once having established the angle, place the heel of the blade at the tip end of the steel, and on the side farthest from the body. Bring the knife downward the whole length of the steel, so that at the end of this stroke the point of the knife is at the hilt of the steel. Now lift the knife up again to the original starting position, alternate to the other side of the steel and repeat the motion, remembering each time to take in the full length of the blade. Most people find this way of alternating surfaces (nearer and farther) on the steel the surest and easiest one for maintaining the blade at its correct and steady angle while in motion.

Once you have mastered the knack of steeling, the trick is to draw the knife along lightly but steadily, with very little pressure, keeping the wrist relaxed (like the bow arm of the violinist), the steel stationary and the eye on the alert to hold the angle. However complicated all this may sound (it takes a good many words to describe the simplest of steps involving one completed movement), I hasten to reassure you that it is a fundamentally easy and elementary physical action. True, a novice, translating words into deeds, might in the very beginning get worked up into knots and go at it too tensely, but after a little effort the arms relax and the free swing up and back becomes as automatic as shifting the gears on your car.

The beginner might well return to his boyhood days long enough to whittle himself a wooden knife, corresponding in size and shape to the knife. With this harmless imitation, he can practice the arm and wrist movement in the steeling action without too much concern for the perfectly good hand holding the steel.

Primary Considerations

It is important to emphasize again that fresh meat is highly perishable, and proper handling is essential to make it into sound and palatable products that will keep satisfactorily. Absolute cleanliness must be practiced at all stages of killing and processing the meat. Only through the elimination of waste and spoilage can the advantages of home butchering be realized.

Preservation of meat begins with the choice of animals for slaughter. In the commercial meat industry, however, there is no critical selection for slaughter because the meat industry adapts the animals offered by producers to meet consumer demands.

But the farmer or anyone who selects an animal for home use often has the chance to choose one that best meets the family requirements. The animal selected should naturally be a healthy one, showing good growth and development. Size and weight are impor-

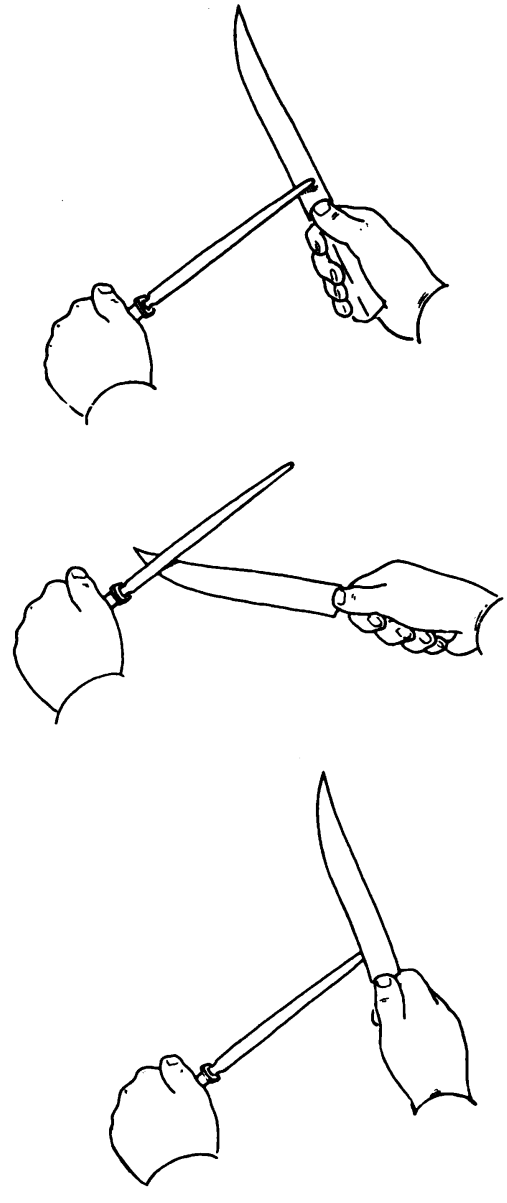


FIG. 19. Steeling the knife: (*top*) Start first stroke with heel of blade against far side and near tip of steel. (*middle*) Draw blade down across steel toward left hand with swinging motion of right wrist and forearm. (*bottom*) Use near side of steel and make second stroke similar to first one.

tant, because they indicate the sizes and weights of the different cuts and the total amount of meat that will be produced.

The late O. G. Hankins, formerly in charge of meat research for the United States Department of Agriculture, states:

Highly important in the selection of animals for butchering is their degree of fatness. Thin, underfinished animals do not make good eating. Moderately well fattened cattle, hogs, and sheep yield the most generally acceptable products. Some consumers prefer highly finished meat, usually because they believe a relatively large percentage of intramuscular fat adds to the eating quality of the lean meat. The meat of highly finished ani-

mals is "wasty," however, and in hogs might mean too much lard. A 250-pound hog yields about 60 percent (10 to 15 pounds) more lard than a 200-pound hog—an example of how weight and finish affect the production of lard.

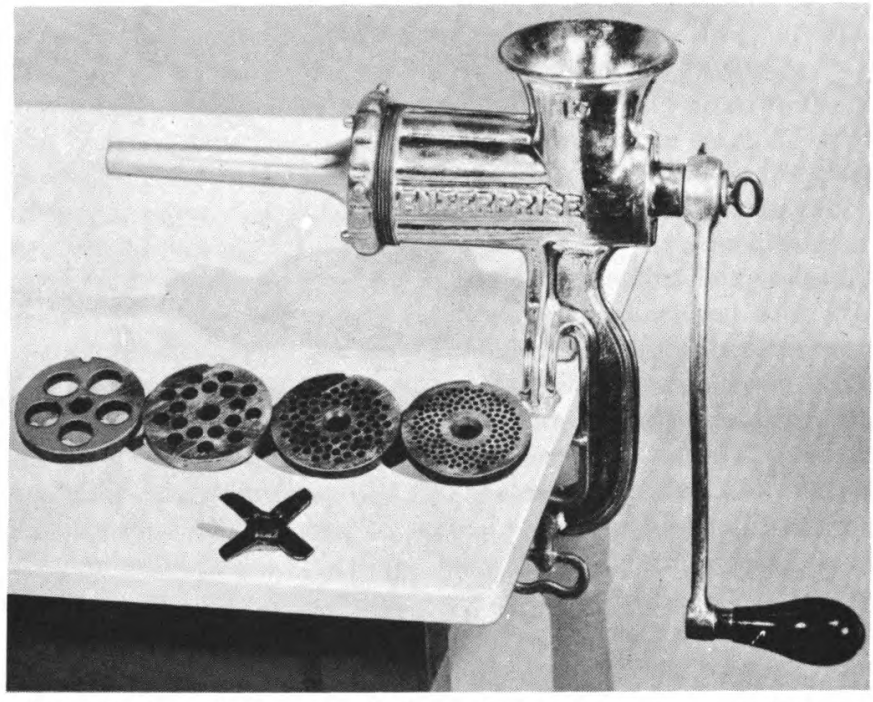


FIG. 20. A good sausage grinder, with stuffer spout and different size plates, makes it easy to put up sausage. Size of plates pictured here 3/4-, 3/8-, 3/16-, and 1/8-inch holes.

Meat preservation begins with the live animal because the quality of the finished meat depends a lot on how the animals were handled when slaughtered, bled, dressed, and chilled. Actual souring has been brought about by improper butchering. The prevention of meat spoilage and also the foundation of quality meat begins with the handling of the live animal. For this reason, the wise thing to do is to carry out properly every step in butchering and processing the meat.

Preslaughter feeding and management call for first consideration. Animals that are to be butchered should be confined in small individual pens for two or three days before they are slaughtered, and for 24 hours prior to killing they should not be given food but should have plenty of fresh water. Meat animals should never be slaughtered when they are overheated, excited, or fatigued, but should be perfectly quiet and rested. Striking with a stick or whip will cause bruises or bloody spots on the dressed carcass that must be trimmed out.

Meat animals should be dispatched quietly and quickly. Bleeding must start promptly and proceed freely and rapidly. Time and temperature are important factors in the preservation of meat. Mr. Hankins emphasizes that there should be no delay in carrying out all subsequent steps, such as scalding and scraping hogs, removing hides of cattle, pelts of sheep, eviscerating, and splitting cattle and hog carcasses. Cleanliness at all stages of the operation is imperative.

The meat experts of the Department of Agriculture tell us that fresh meat is an excellent medium for the growth and development of bacteria. Therefore, dressed carcasses have to be chilled promptly. Cool them at an internal temperature of 35°F. or lower within 24 hours or less.

Meat animals for home use should be slaughtered when weather conditions are favorable for rapid cooling of the carcasses. About 24 hours are necessary for proper chilling, and a good rule to follow in warmer sections is to kill in the afternoon, and then the cool night is just ahead for starting the chill.

Skinning or Flaying

Before one begins to slaughter one should be well informed on the methods of skinning meat animals. Hides and skins are an important source of the raw material of the leather industry. Tanners buy these raw materials on their merits, paying a price based largely on the quality and quantity of the leather and on the uses to which it can be put.

Packers' hides and skins are taken off by men employed exclusively for the purpose of removing hides. As the hides are taken off in large numbers they are uniformly selected and cured. The result is a product of uniform selection, good pattern and trim, and with few imperfections, making possible a maximum yield of leather of the best quality.

Country hides and skins are taken off by farmers, ranchmen, rural folk, local butchers, or by their helpers, who are usually inexperienced in skinning. Such hides and skins are usually handled several times before becoming available for uniform selection. Not only is the yield of leather from such hides and skins comparatively low and uncertain, but the leather is adapted to limited use only.

The wide difference between the prices of the raw and the finished products, as well as the low prices paid for the so-called country hides and skins as compared with the prices paid for those marketed

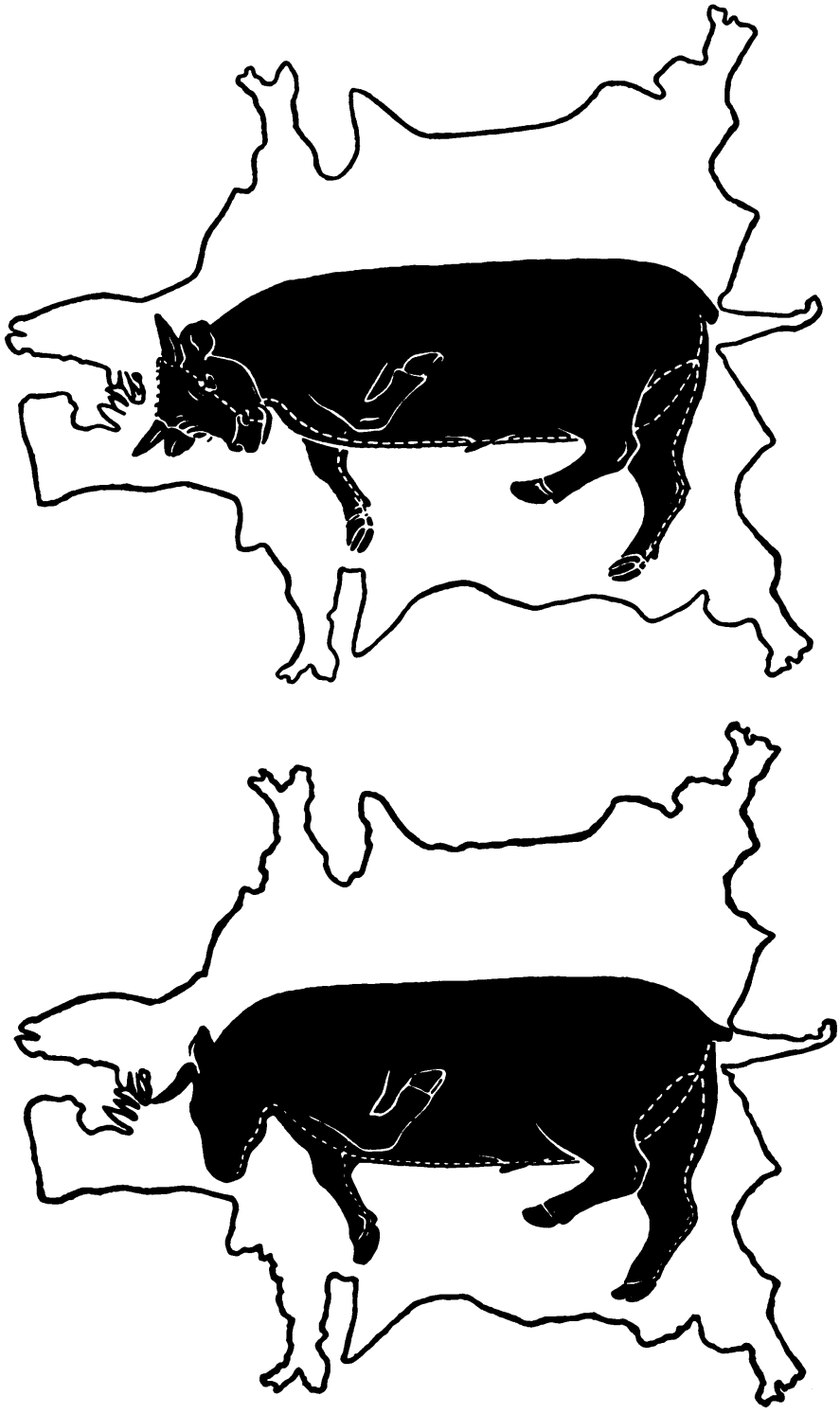


FIG. 21. Top and bottom show the proper ripping-open cuts for a correct pattern. The dotted lines show the path of the knife, and the solid lines show the appearance of the hide when spread out.

by the packers, is also due partly to several factors less difficult to control than those just mentioned. Among them is the general inferiority of country hides and skins, due to indifferent and improper methods of handling. Much improvement is possible along these lines. It rests entirely with the one who handles the hides and skins, whether he be farmer, country butcher, or suburbanite.

There are three important operations in the handling of hides and skins: take-off or skinning; salting and curing; and marketing. Unless these operations are performed properly and efficiently, bearing constantly in mind that the hide or skin, as well as the meat, is an article of value, the loss to anyone with only an occasional hide or skin to market, will be appreciable. The improvement in quality and the better returns will more than offset the little extra time and effort required for carefully following correct methods.

Always clean the animal before killing it. Remove the dirt and manure carefully so that the hide is not scratched or scarred. Careless cleaning, particularly in the case of calves and other young animals, often causes serious damage to the skin. The old-fashioned curry comb or other instruments with sharp teeth are not satisfactory. A fiber brush and water are most satisfactory.

Avoid causing damage to the hide or skin while handling the animal. In stunning or knocking it down, be sure it does not fall on stones or rocks that will bruise the hide. In subsequent handling do not drag the carcass around so as to rub the hair off the skin.

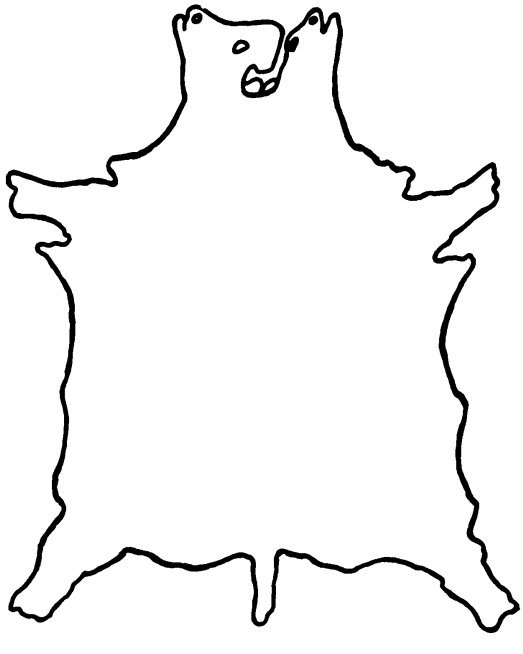


FIG. 22. Hide of good pattern and trim.

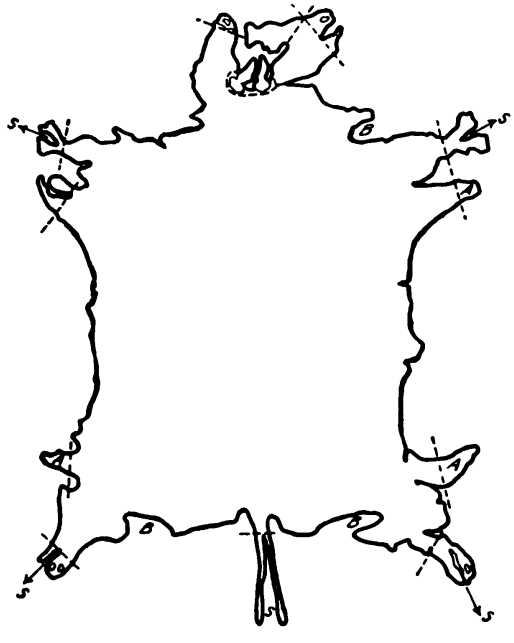


FIG. 23. Hide of poor pattern and trim.

Keep the skinning knife sharp; use it carefully but no more than necessary. Avoid cutting the hide or skin but not at the expense of the meat. Leave the flesh on the animal; besides a loss of food, its presence on the hide or skin is very objectionable—it lowers the quality of the hide. Skinning is done best and most easily before the animal heat has escaped.

The techniques of skinning are difficult to describe so that they may be followed easily. In fact, expertness in flaying, especially of hides, can be acquired only by practice. It requires patience and skill, and care must be exercised until the skill is obtained. Written directions cannot be as clear and effective as actual observations and trials. Before killing an animal one can learn much by visiting a small or large slaughter house and observing the methods employed.

Although proper skinning, without scores or cuts, requires practice, a proper pattern requires only a sharp knife and straight ripping-open cuts along the correct lines. All the ripping-open cuts for skinning a beef are clearly shown by dotted lines on page 68. The outlines show the resulting correct pattern or appearance of the hide when spread out flat. The contrasting points in pattern and

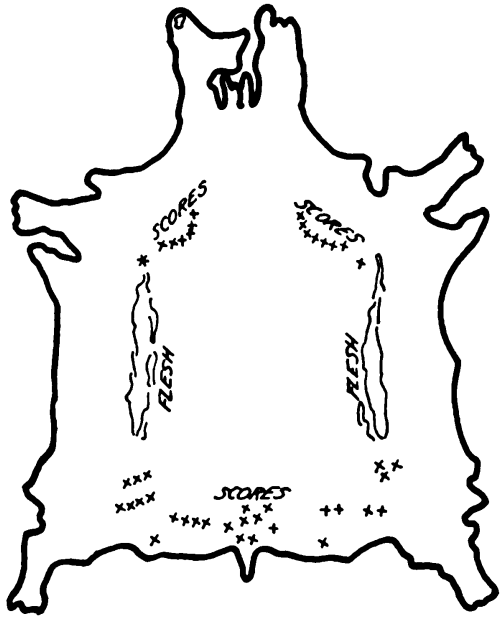


FIG. 24. Careless skinning will produce defects from scores and flesh prevalent in the areas indicated in the diagram. Scores are very numerous around the tail and in the butt, which is the most valuable portion of the hide. Careful knife work will prevent these defects.

trim are shown on page 69. The irregular edges and the shape of the hides, the split shanks and tail, and the dewclaws shown in the hide of poor pattern and trim are absent in the hide of good pattern. The dotted lines marking the hide of poor pattern show how much must be trimmed off before tanning. This is all waste and reduces the area or size of the hide.

Detailed instructions for killing and skinning the various species of meat animals are given in the following chapters.

Examining the Carcass

All the internal organs, as well as the carcass, of animals intended for food, including poultry, wild fowl, and other game, should be carefully examined at the time of slaughter for disease or other condition that might affect the fitness of the meat for food. The only person qualified to do this properly is a veterinarian educated and trained to perform this important duty. If one is not available, an examination of some value can be made by anyone thoroughly familiar with the appearance of normal organs and meat. If a person is not familiar with such appearance he will not be able to recognize changes from the normal. If evidence of disease or change is found, the next point to be determined is whether the condition is local or general. A localized condition affects a limited part only. Bruises, minor injuries, parasites in organs, an inclosed abscess, or a single tumor, may be cited as local conditions, and removal of the affected part is usually all that is required. A generalized condition is one which more or less affects the whole carcass. The presence of great congestion or inflammation in the lungs, intestines, kidneys, or on the inner surface of the chest or abdominal walls is to be regarded as showing generalized conditions. Numerous yellowish or pearl-like growths scattered through the organs or on inner surfaces of chest or abdominal walls indicate generalized tuberculosis. An

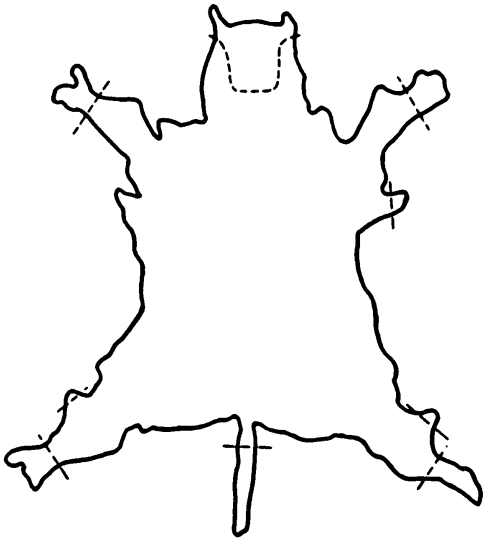


Fig. 25. A calf skin of good pattern and trim. The dotted lines indicate the amount cut off before tanning.

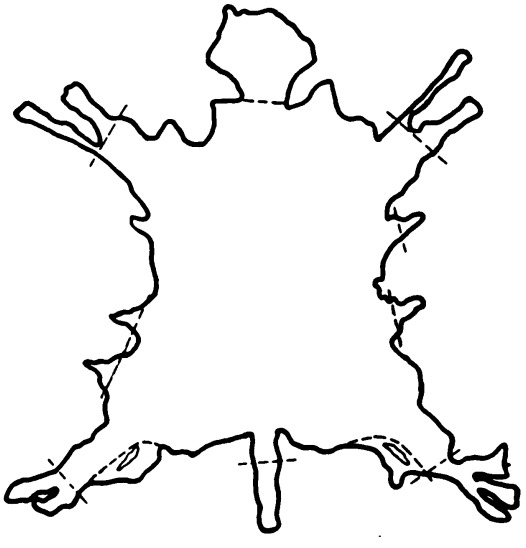


Fig. 26. A calf skin of poor pattern and trim. The dotted lines show the excessive amount of trimming necessary because of the poor pattern. The head and practically all of each shank must be cut off.

abnormal color of the meat is usually due to some generalized condition. All generalized conditions are to be viewed seriously. Any such case should be submitted to a graduate veterinarian for examination and opinion as to the fitness of the meat for food.

Regulations for Shipping Meat or Meat Food Products

Farmers who ship their meats must comply with official State and Federal regulations. Below is shown a sample shipper's certificate such as must be used in interstate shipments of uninspected meat or meat food products which are from animals slaughtered by the farmer on the farm. Blank certificates should follow this sample. In size the certificate should be 5½ by 8 inches.

Shipper's Certificate

Date_____, 19____.

Name of carrier_____

Shipper_____

Point of shipment_____

Consignee_____

Destination_____

I hereby certify that the following-described uninspected meat or meat food products are from animals slaughtered by a farmer on the farm, and are offered for transportation in interstate or foreign commerce as exempted from inspection according to the Meat Inspection Act of March 4, 1907, as amended, and that at this date they are sound, healthful, wholesome, and fit for human food, and contain no preservative or coloring matter or other substances prohibited by the Federal meat inspection regulations.

Kind of product	*Amount and weight*

_____
(Signature of shipper)

_____
(Address of shipper)

Two copies of this form are to be presented to the common carrier with each shipment.

V

BUTCHERING HOGS

Pork is the most popular meat for home processing. It can be prepared in many different ways and is easy to cure and to keep over long periods of time. Pork is also our most nutritious meat and produces a higher percentage of edible meat products than any other meat animal.

Selection of Hogs for Slaughter

High quality meat, with a full finish and rich flavor, is produced by medium-weight hogs, and these should be the only ones butchered for home use. Thrifty, properly fattened hogs from 8 to 10 months old and weighing from 180 to 250 pounds are the best ones for home butchering. Hogs of this size are more easily handled, and the meat chills more quickly. They produce moderate-sized cuts and usually a desirable portion of fat and lean. Medium-weight cuts will also cure quicker and more uniformly than heavier cuts. Medium-weight hams, shoulders, and bacon are finer in texture and flavor and are of better quality than those from older, heavier hogs. Heavier hogs will produce more lard.

Sticking

The care of an animal just before it is slaughtered, previously described on page 57, has much to do with getting a good "stick." Sticking is the best method of killing. It is practical, efficient, and humane. It is best not to stun or shoot a hog before sticking.

If the animal is stuck without being stunned, the blood will drain out more completely than if it is stunned first. If a block and tackle with hoisting arrangement is available and fastened securely 10 or more feet above the ground, loop a chain around one hind leg and

AVERAGE PERCENTAGES

(Of Certain Parts of Hog Carcasses Classified According to Live Weight of Animal)

Hogs, carcasses, and parts	Data for hogs weighing—				
	Less than 130 lb.	130 to 159 lb.	160 to 199 lb.	200 to 249 lb.	250 lb. or more
Hogs.....number.	26	41	199	240	92
Average live weight at slaughter.....pounds.	106	146	183	218	289
Average weight of chilled carcass.....do...	78.0	116.0	146.0	177.5	238.5
Hams.....per cent [1].	19.9	18.4	18.4	17.5	17.0
Loins.....do...	13.2	12.2	12.1	11.6	11.0
Bacons.....do...	9.4	10.1	10.8	11.4	11.9
Shoulder (3-rib, full cut).....do...	18.5	17.7	17.4	17.0	16.7
Head.....do...	10.7	9.8	9.4	8.9	8.5
Cutting fat [2].....do...	10.9	15.0	16.8	19.5	21.5

[1] Percentages of parts based on weight of chilled carcass.
[2] Consisting of back fat, leaf fat, and fat trimmings.
SOURCE: AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

PERCENTAGE COMPOSITION OF EDIBLE ORGANS (PORK)

	Water %	Protein %	Fat %	Ash %	Other constituents %
Liver	72.84	19.81	5.28	1.50	0.73
Kidney	76.25	17.00	5.41	1.18	0.16
Heart	79.29	17.69	1.63	1.10	0.29
Tongue	68.30	17.00	13.27	0.94	0.49
Brains	78.36	10.31	7.48	1.45	2.40

SOURCE: AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

draw the hog backward through the gate of the pen and up for swinging. Care should be taken to loop the chain between the hock and the hoof so as not to bruise the ham shank. This is the easiest way, for both man and hog, to restrain the animal for sticking without stunning.

If a gadget for hoisting the hog is not available, then roll the hog on its back and stick on the ground. To get the hog in proper position for sticking on the ground, reach under the animal and grasp its opposite front leg, then roll it upon its back and hold it firmly by the front feet. The man holding the hog stands astride of it, facing forward, with his feet and knees pressed against the shoulders of the animal to prevent it from rolling.

FIG. 27. Sticking the hog on the ground. The feet and legs of the man holding the hog are pressed against the shoulders of the animal to prevent it rolling.

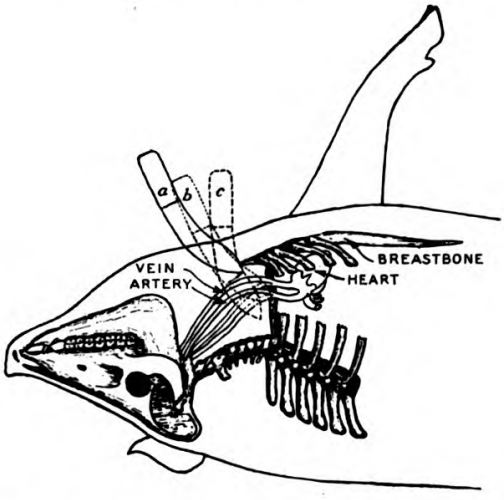


FIG. 28. The three positions of the knife in sticking a hog: (*a*) the knife inserted in the fat; (*b*) the second position places the knife above the artery; (*c*) the final position, after the downward thrust has been made and the artery severed.

The following sticking method for the beginner is recommended by the United States Department of Agriculture. The man doing the sticking takes a position squarely in front of the hog, holds down the snout, and opens the skin for a distance of about 3 inches in front of the breastbone, not downward as is often done. When the breastbone is reached, he follows downward with the point of the knife until the knife slips under the breastbone and between the ribs. He then pushes the knife in about 1 inch and directs the cut first downward toward the backbone, then forward toward the head.

Care should be taken to hold the animal squarely on its back and to keep the knife in the center so as not to stick a shoulder. It is difficult and unwise to stick the heart. Let it pump out the blood as long as possible. A quick and thorough bleed is one of the foundation steps in processing high quality meat, and too much emphasis cannot be placed on the importance of a good bleed.

SCALDING

A hard wood or metal barrel, 50-gallon capacity, is satisfactory to scald a hog weighing up to 250 pounds. The most convenient vessel in which to heat the water for scalding is a large caldron or kettle, which should be located near the place of butchering. A scalding tank built for the purpose makes the job easier. A metal trough or watering tank 5 to 6 feet long, 30 inches wide, and 15 to 24 inches deep may be converted into a combination water heater and scalding vat. It can be set up on bricks or put over a pit. The sides are banked with earth and a fire built beneath. This arrangement permits holding the temperature of the water at the proper point for scalding any number of hogs.

A convenient table is one 4½ feet wide, 2½ feet high, and 4 to 8 feet long. On a table this wide the hog can be laid crosswise so that one man may scrape the rear end while the other scrapes the head.

At a slaughterhouse where steam is available to maintain the scalding water at a steady temperature, the water is usually held at 140° to 144°F. In water at these temperatures it requires from 3 to 6 minutes to loosen the hair and scurf, but there is little or no danger of setting the hair or cooking the skin. In autumn when the winter hair is beginning to grow and most hogs are difficult to scald, temperatures as high as 146° to 150° are sometimes used.

At home on the farm or in the suburbs when a barrel is used for scalding, it is difficult to maintain the required water temperature or to reheat the water promptly, and temperatures of 155° to 165° often must be used at the beginning so that the water will not become cold before the hog is completely cleaned. In water this hot, the hog must be kept in motion and pulled from the barrel to give it frequent chances to cool. This lessens the danger of setting the hair. It is advisable to have plenty of boiling water available so that the lower temperatures can be used at the beginning and more hot water added if necessary. By using a good thermometer you can always know when the water is at the correct temperature, which not only makes scalding easier but eliminates the setting of hair.

FIG. 29. Scalding the hog in a barrel. Keeping it in motion lessens the danger of setting the hair, and works the water into the wrinkles of the skin.

Lime, wood ashes, and rosin put into the water make the hair cling to the scraper and pull out more easily. Remember, however, that the temperature of the water when scalding a hog is more important than any substance that can be put into it.

Twenty-five to thirty gallons of water is ordinarily enough to scald a hog in a 50-gallon barrel. Light-weight or medium-weight hogs can be practically immersed in the barrel.

The barrel should be set at about a 45° angle at one end of the scraping table; or, if a hoist is available, the barrel may be set upright under the hoist to save lifting. It is good practice to scald the head first while the hind legs are dry. Two men are required to handle this job satisfactorily. Each grips a hind leg and the hog is immersed in the hot water. It should be kept moving in the water to be sure no part rests against the side of the barrel. Occasionally the hog should be drawn part way out of the water to air when the hair may be "tried." When the hair and scurf slip from the surface, scalding is complete. Then pull the hog out of the barrel, place the hook in the lower jaw, and scald the hindquarters. At this time, a third man, if available, can remove most of the hair from the hot forelegs, flanks, ears, and head even though the animal is kept in motion. This should be done immediately, as these parts cool quickly.

SCRAPING

When the hog is completely scalded, pull it out of the water and turn it crosswise on the table. One man should grip the hind legs with both hands and twist off the hair, then with the hook pull off the dewclaws and toes while hot. With a bell scraper he should remove the hair and scurf from the hindquarters. Scraping strokes made with the lay of the hair will remove it easier. Another should scrape the hair from the forequarters, feet, and head. After some experience, one will learn to stretch the skin by the leg or head so as to smooth the wrinkles and make scraping easier. If patches of hair have not been thoroughly scalded, it is often possible to loosen them by covering them with sacks or hog hair and pouring hot water on them. The removal of hair and dirt from the hot carcass should be done as rapidly as possible, as there is a tendency for the skin to "set" and render the removal of the hair difficult. As soon as the hair is removed, pour hot water on the carcass and place the bell scraper flat against the skin and work the scraper in a rotary fashion. This will massage out much of the dirt and scurf from the skin. A blowtorch and a wire brush will be useful in singeing and scrubbing the head and feet. Next, rinse the hog completely with cold water

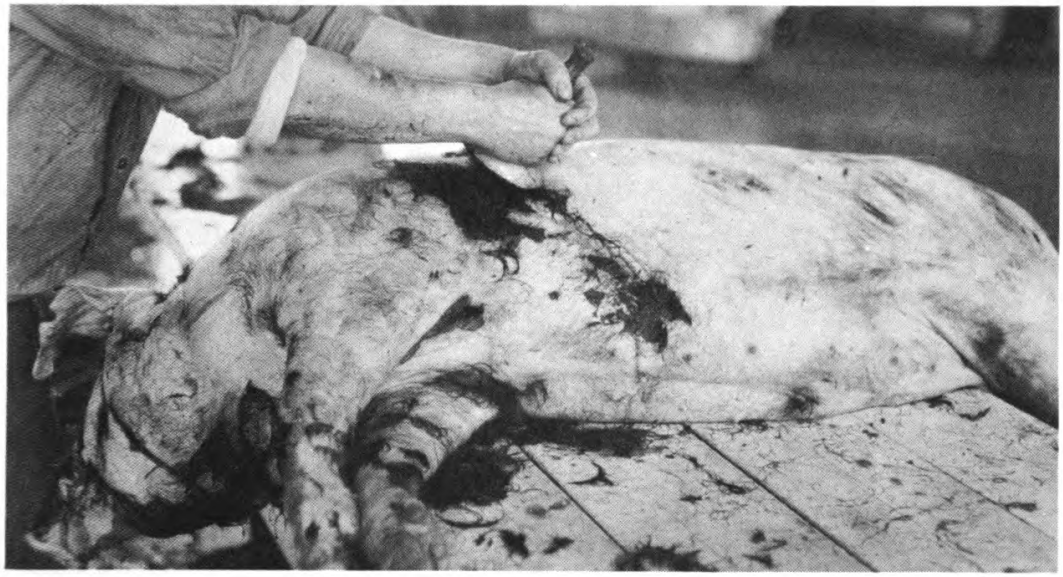


FIG. 30. The hair and dirt are scraped off by tilting the bell scraper on its far edge and pulling forward. Use both hands and plenty of pressure.

FIG. 31. The head is cleaned by scraping, singeing, and then scrubbing with a wire brush.

and shave the entire carcass with a knife. It is now ready to be hung up. Make a deep cut up the center of the hind legs from the foot toward the hock. Push the skin aside with the knife and the tendons will be found. Cut down to the bone at the side of the tendons. Free the tendons on both sides with the knife and fingers. Lift the tendons with the fingers and hook over the gambrel. Be sure the gambrel or singletree hooks engage both tendons. After the

carcass is raised by a block and tackle or a chain hoist, wash the carcass again with cold water and shave. If the carcass does not have a clean white appearance, douse it again with water and scrape down with the back of a knife so that the carcass will be clean and dry. Before opening the carcass be sure that all knives are clean and well scalded.

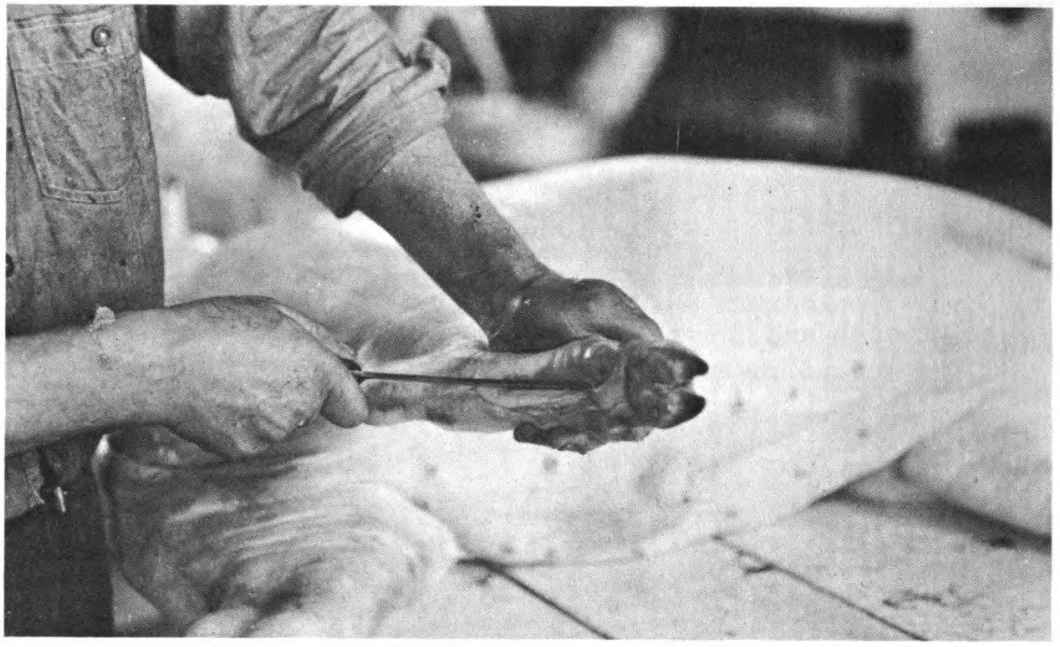


FIG. 32. Raising the gambrel tendon.

REMOVING AND CLEANING THE HEAD

First removing the head permits the complete drainage of blood from the carcass, and it also is an aid to rapid chilling. Make a cut just above the ears at the first joint of the backbone and all the way across the back to the neck. Sever the gullet and windpipe to let the head drop, then pull down on the ears and continue the cut around the ears to the eyes and then to the point of the jawbone. This frees the head but leaves the jowls on the carcass. The head should be washed thoroughly and trimmed as soon as possible.

Make a deep slit on the underside of the ears and peel and clean out the core or waxy portion. With a narrow sharp knife, cut out the eyes and eyebrows by following around the eye socket.

Cut out the tongue, clean thoroughly in water, and hang it up. Cut the muscles free from each side of the lower jaw and revolve the jaw out of its socket or hinge joint by pulling the jaws apart.

FIG. 33. Removing the head.

Carefully trim all the meat off the lower jaw and discard the bone. Remove the snout and the skin from the front of the face. Saw off the face bones just back of the teeth. With the saw, cut the skull lengthwise and remove the brain. This method of preparing the head leaves no bone splinters. Now the head is cleaned and ready for making headcheese and other pork delicacies.

REMOVING THE ENTRAILS

Score the belly by making a slight incision from a point between the hams to the sticking cut in the throat, but be careful not to cut through the belly wall. Now, insert the skinning knife, edge up, into the place the hog was stuck and cut up through the full length of the breastbone as a pry to split the breastbone and divide the first pair of ribs. If the breastbone is hard to cut, as it may be in older

FIG. 34. Scoring the belly.

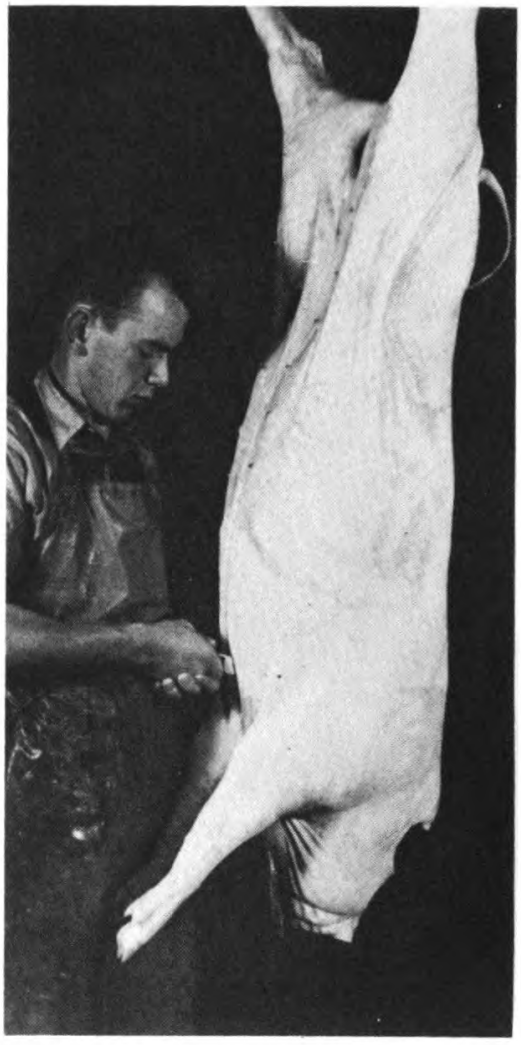


FIG. 35. Cutting through the breastbone.

hogs, the cut may be made a little to one side of the middle where there is softer bone, or a saw may be used to cut the breastbone. In making this cut care should be taken not to extend the incision upward beyond the chest cavity. To do so will cut into the stomach or cause the intestines and stomach to protrude and interfere with the next operation. The blood that has accumulated in the chest cavity will drain out when the breastbone is split, and you can tell whether you did a good job of sticking by the amount of blood in the chest cavity when the breast is opened.

If the hog was swung before sticking and the vein and artery severed well in front of the heart, very little blood will be left in the chest cavity to drain out. Getting a good bleed is very important, as meat cannot be properly chilled and cured without being properly bled.

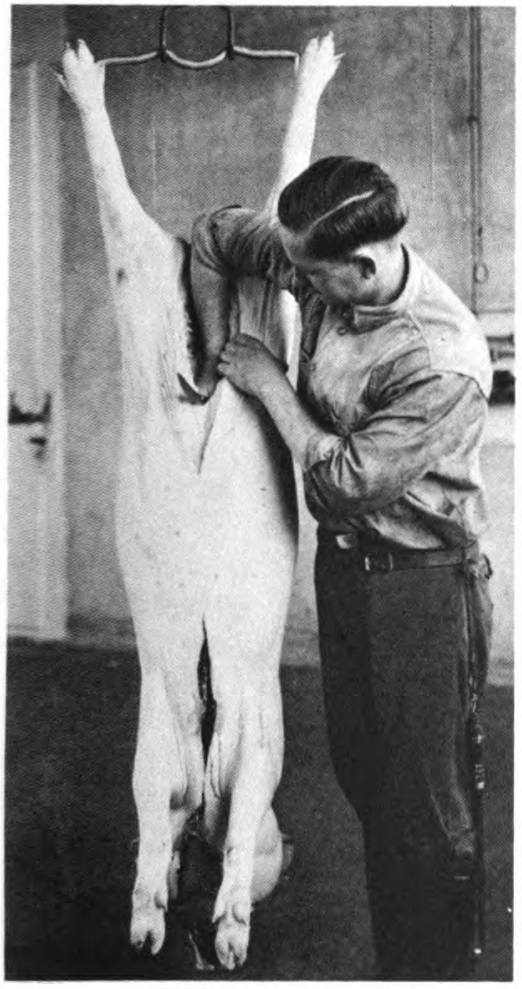


FIG. 36. This method of opening the carcass prevents cutting the intestine or stomach.

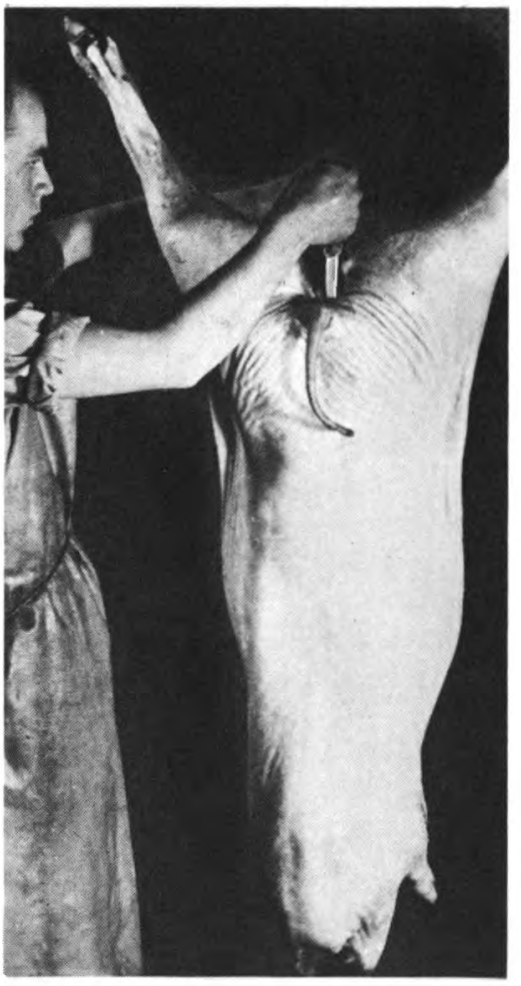


FIG. 37. Opening the bung.

Now, begin at the other end of the carcass and make a short incision in the abdominal wall near the top. Place the hand clasping the knife handle inside the abdominal wall, with the blade pointing out. Let the fist that grips the handle drop down until the knife slants upward. The cutting is done with the heel of the blade and the fist crowds the intestines away from the outer edge as the ripping is continued downward. When the belly wall is cut through, the intestines will fall downward, but the attached muscle fiber will not let them fall far. This is the safest and quickest way to rip the belly, and there is no danger of cutting the intestines or stomach.

Make a cut down between the hams, taking care to keep the knife in the center. As the hams open, the white membrane which marks the exact middle can be seen. Follow this if possible to the pelvic

bone. When the aitchbone is reached, the point of the knife is placed against the center seam of the bone. By striking the butt of the knife handle with the palm of the hand, the seam of the aitchbone is split quite easily. With older hogs, it may be necessary to use a saw to split the aitchbone. While dividing this bone, care should be taken to avoid puncturing the urinary bladder, which lies just below. In dressing a barrow, loosen the penis and let it hang, to be removed later with the bung.

Stand facing the back of the carcass on a bench and dissect out the bung (rectum). Grasp the bung gut just below the split in the aitchbone and loosen upward toward the end of the bung. Then begin in the front and cut completely around the bung end. Securely tie the end with a cord and pull the bung out and down, cutting around it where it does not pull loose.

When the bung gut is worked down toward the entrails, the entire mass of entrails should be worked outward and downward, leaving as much fat as possible along the backbone. The kidneys are left in the leaf fat which surrounds them.

With the left hand, grasp the intestines firmly just below the kidneys at the point where they appear to be attached to the backbone. Push down slowly but firmly until they loosen from the back. Free the liver by running the fingers of the right hand behind it and pulling it away from the back. Still holding the intestines in the left hand, cut through the diaphragm to the backbone. Extend the cut around the white fibrous portion of the diaphragm, which is parallel to the ribs, to the breastbone and down the breastbone to the throat. This last cut loosens the heart and lungs in the chest cavity. Still holding the intestines with the left hand, repeat the cut on the left side of the carcass, crossing the right hand over the left. It may sometimes be necessary to cut the back artery from the backbone, thus permitting the left hand to pull the entire offal out of the carcass. The gullet is still attached to the throat, but one cut of the knife will free it. A tub should be handy to receive the mass of entrails when they are freed from the carcass. The body cavity should be washed and rinsed with cold water before the carcass is split.

Handling and Care of Edible Organs

Now work over the entrails in a tub or on a table. Cut off the liver and remove the gall bladder. The small upper end of the gall bladder can be lifted with the thumb and finger and the bladder peeled out. The heart is cut off through the auricles or "ears." Next

FIG. 38. In removing the intestines, grasp them carefully and firmly so they will not tear and fall.

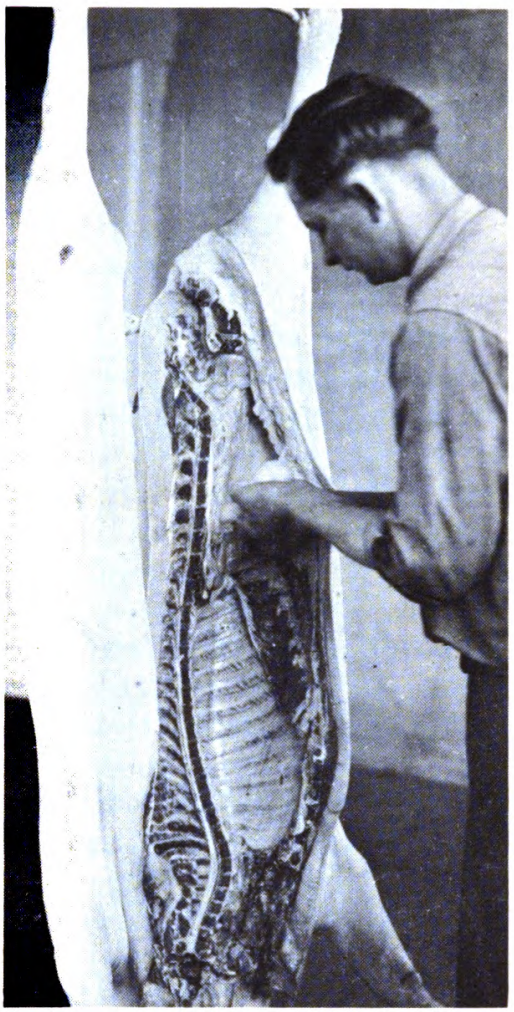


FIG. 39. The warm leaf fat is pulled out by loosening it at the rib end and fisting it up and out.

remove the spleen or "melt." All these parts should be washed promptly in clean, cool water and hung up for further chilling and drying. A thin layer of caul fat covers the stomach and is attached to its outer border. It can be separated from the stomach with the hands, washed in cold water, and hung up to chill. The stomach should be cut loose and tied off.

The small intestines can be used for sausage casings. If they are to be used for this purpose, they should be worked while they are still warm. Lay them on a table and tie the end of the small intestines. Then remove them or "run" them from the ruffle fat by pulling the fat in one direction with the right hand and the intestines in the opposite direction with the left. The ruffle fat is then

peeled off. This fat, if not fouled in dressing, can be saved for lard, although such lard is not high grade. It is better adapted for making soap grease. At any rate, it should be thoroughly washed and promptly chilled in cold water. Then it should be hung up to dry before being rendered.

Cleaning the Intestines

Next, the contents of the small intestines should be carefully stripped out and the casings thoroughly washed. Then reverse them by turning up a fold at the end of the casings like the cuff on a pair of trousers; pour warm water into this fold. One person should hold the intestines while another pours the water, and a third "feeds" in the intestines as the weight of the water reverses them. To facilitate this operation, the intestines should be cut into several lengths. The mucous coat, which is now on the outside after the intestines are reversed, can be scraped off with the back of a knife blade, or scraped through a sharpened notched stick by drawing the casing between the notch and the thumb.

To do a thorough job of cleaning, this operation should be repeated several times, and the casings washed in lukewarm water. The casings should be clear when completely cleaned. If dull spots appear, continue scraping until they are removed. If the casings are not to be used at once after cleaning, they should be packed in dry salt until they are to be used.

Muslin, cellophane, and other manufactured casings are now available for sausage making, and some folks prefer to use these and feed the intestines to the hogs or the chickens.

The intestines and stomachs, if properly cleaned, are edible. These are known as chitterlings. If the stomach is to be used as a container for headcheese, cut a slit 4 or 5 inches long in the small end. Work out the contents without enlarging the opening. Then turn the stomach inside out and wash it thoroughly. Place the stomach in scalding water until the inner lining can be removed easily. Scrape off all the inner lining and wash with cold water. Pack in salt until ready to use. If the stomachs are to be used as an ingredient of headcheese, cooked sausage, or scrapple, the same procedure is followed with the exception that the stomach may be split wide open for greater convenience in cleaning.

Split the hog carcass while it is still warm. This helps hasten the chilling, as more surface is exposed. With a saw or cleaver, split down the middle of the backbone. Leave about 15 inches of skin

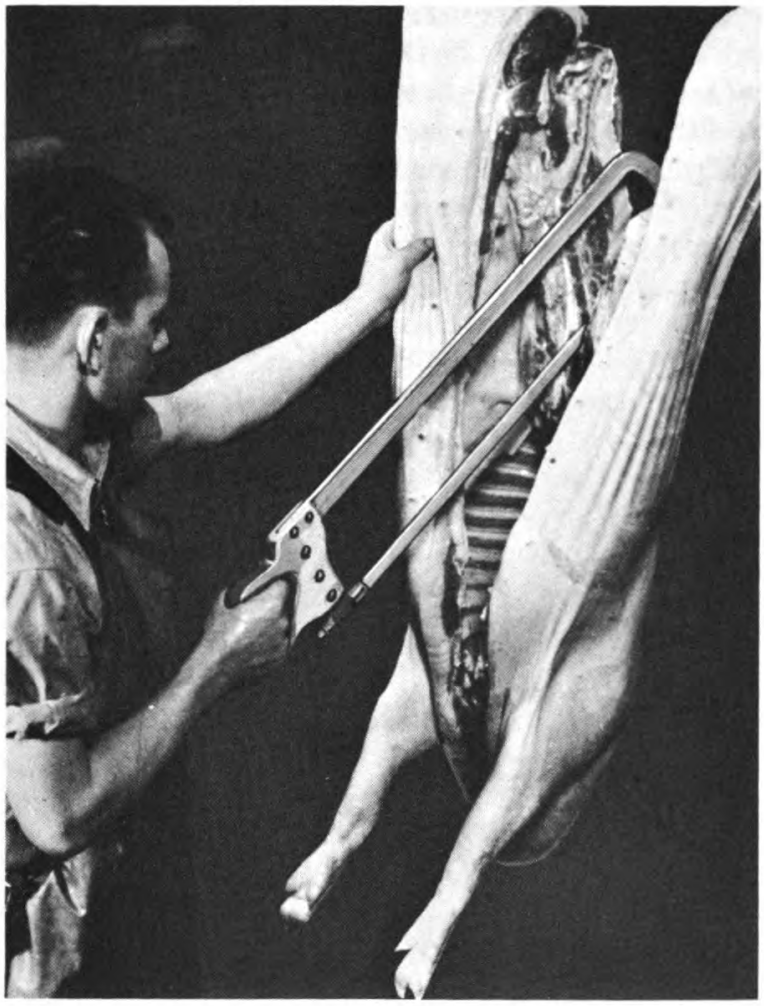


FIG. 40. Splitting the backbone.

uncut at the shoulders to keep the carcass from completely separating or slipping off the gambrel or singletree. This method of splitting the carcass eliminates the savory country-style backbone piece or chine, but it gives more useful finished cuts suitable for curing and canning.

CHILLING

The split carcass will chill more rapidly if the leaf fat is pulled out. This can be done efficiently by loosing it where it is attached to the diaphragm at the last rib. Hold the end of the leaf fat with one hand and, with the fist of the other, loosen the leaf fat by fisting upward. This is easily accomplished while the carcass is warm, and its removal helps the carcass chill out quicker.

For the same reason, the hams should be faced while warm. This cut is started on flank side of the ham. Grasp the skin you have cut loose, and continue cutting by following the curvature of the ham to remove the outer layer of fat and skin from the inside of the ham. Cut over the face of the ham muscle to the tail head. When the carcass is chilled it is not so easy to do a neat job. Exposing the ham muscle permits a more rapid chilling and the thin fibrous membrane next to the lean meat will shrink to it, giving a smooth appearance to the hams after they are cured.

The carcass is now ready for chilling. Be sure to suspend the whole or half carcasses so they do not touch. When hams touch each other, chilling is often delayed too long, and spoilage occurs. The need for prompt chilling of warm carcasses cannot be overemphasized. To do a neat job of cutting and trimming, the carcass must be thoroughly and completely chilled. This is also an important factor in turning out good meat. With the head removed, splitting the carcass, the leaf fat fisted out, and the hams faced, the carcass is in the best possible condition for chilling. The air can circulate freely to each part of the carcass, thus taking full advantage of the weather for getting a good chill. About 24 hours are required for proper chilling, and a good rule to follow in warmer sections is to kill in the afternoon, so that the cool night is just ahead for starting the chill.

Many communities in the South as well as other sections of the country have access to local cold-storage plants with facilities to chill the carcass and to store the curing meat. The warm sides are brought in immediately after slaughter, and the owner returns 1 or 2 days later to cut the pork and put the meat in cure in the drawer, box, or bin assigned to him. The fresh cuts, meat trimmings for sausage, and fat for rendering into lard are taken home. In some cases the cold-storage locker plant does the cutting. Where a community cooperates with a cold-storage plant, nominal charges to those who participate can often be obtained. More about cold-storage locker plants and the services rendered are given in Chapter XIII.

For proper chilling, the temperature in the center of the hams should be lowered to around 33 to 35°F. A meat thermometer inserted into the center of one ham will show you when the meat is properly chilled.

If the weather becomes warm and no cold storage is available, the iced-brine method of chilling is a good one to follow. By cutting each half of the carcass as illustrated on page 90, you can quickly

separate it into a few major pieces. Fill a clean barrel about a third full of water, stirring up in the water about 3 pounds of common salt. Put in some large chunks of ice and the pieces of meat. This iced brine will be colder than ordinary ice water and will satisfactorily chill the meat even in mild weather. Another method is to place a layer of chipped ice on a clean surface, spreading the carcass out on the ice and putting additional chipped ice on top. The iced-brine method in the barrel, however, is more efficient and gives a better chill.

Sometimes insufficiently cooled pieces are salted lightly with a

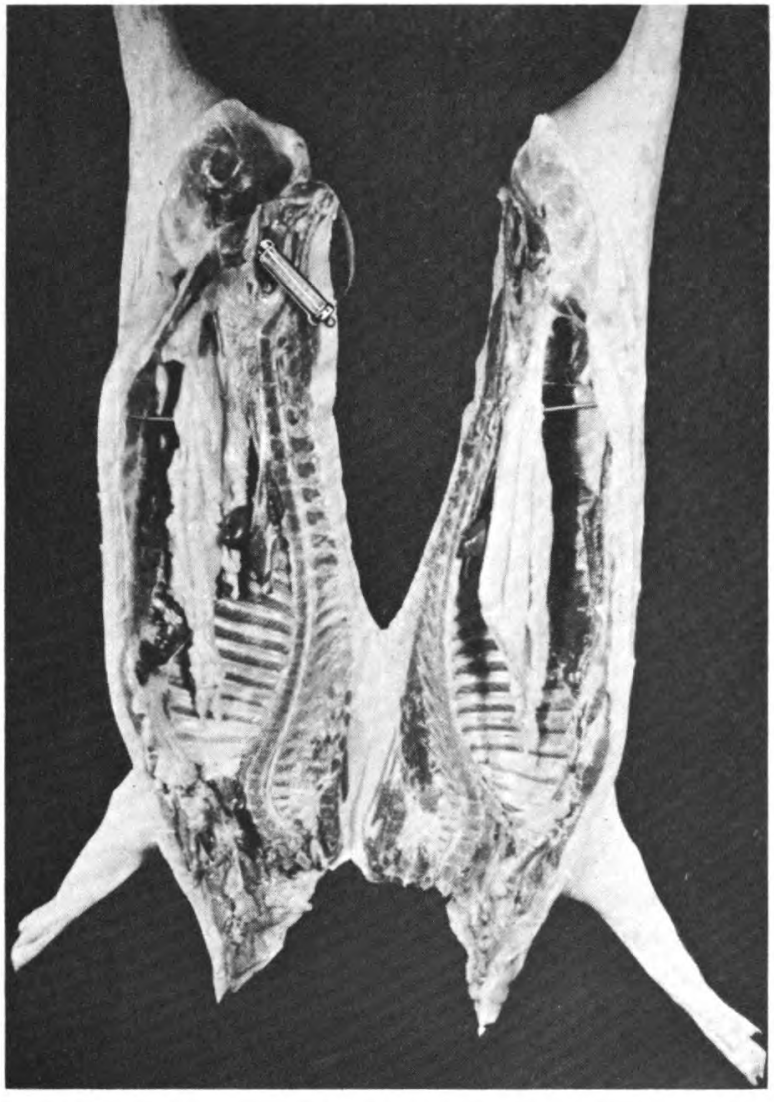


FIG. 41. The carcass is now ready for chilling. The meat thermometer inserted into the center of the ham shows when the meat is properly chilled (30° to 35° F.).

dry-cure mixture and spread on a rack where they will have as much ventilation as possible. None of the methods just described for chilling pork are as safe or as satisfactory as storing the meat at the proper temperature, either natural or artificial.

Meat should not be cut up and put into cure until it is thoroughly chilled and all the animal heat is out. A good job of cutting and trimming meat cannot be done on warm meat. Neither should salt be applied to warm meat. Quite often home-cured meat has been made inferior in quality and actual loss caused by cutting up and salting meat that still has the animal heat in it.

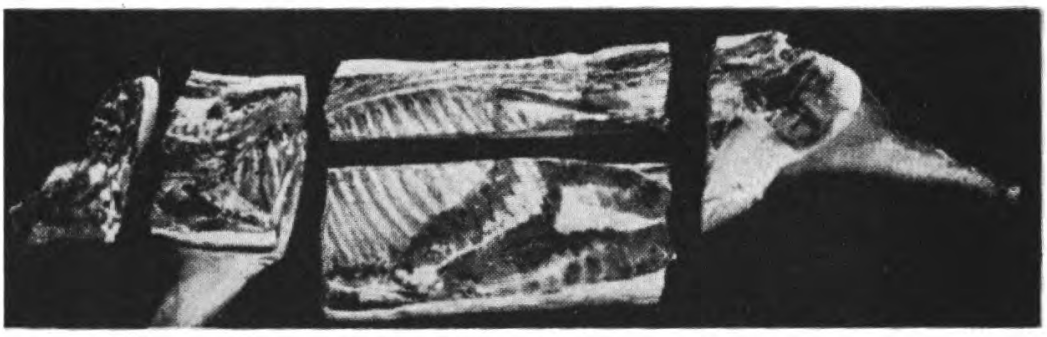


FIG. 42. Brine chilling. Separate each half of the carcass into these major cuts or pieces.

VI

BUTCHERING CATTLE

Home dressing and cutting up beef often makes it possible to procure meat at a considerable saving. The most satisfactory animals to select for this purpose are yearlings from a good type of beef cattle. Yearlings produce light carcasses and light cuts which chill quicker, and the meat is more tender than that from older animals. The care and management of animals before slaughter and the equipment and tools have been discussed previously.

Stunning

The animal should be killed where the carcass is to be hoisted. Stunning is the best method to render a beef animal unconscious in order that it may be bled properly. It may be tied securely to a post or tree, or tied in position for stunning. To accomplish this, the head is tied in a position that will enable a man to stun the animal by a blow on the forehead with an axe or sledge. The proper place to strike is just above the center of the forehead. Draw imaginary crosslines from the horns to the eyes. Strike with a short, powerful blow at a point just above where these lines cross.

Bleeding

With the animal lying on its side, the sticker should face the same direction as the animal. He should stretch the animal's neck out as far as possible, holding it in position with one foot against the jaw and the other in front and against the forelegs. Pressure should be applied on both the jaw and forelegs to maintain the stretch and make it more convenient for sticking the animal. This also lessens the danger of the sticker being struck by the front feet of the animal. With the sticking knife, cut through the skin from the breastbone toward the throat, making a cut about 10 to 12 inches long and deep enough to expose the windpipe. Insert the knife with the back of

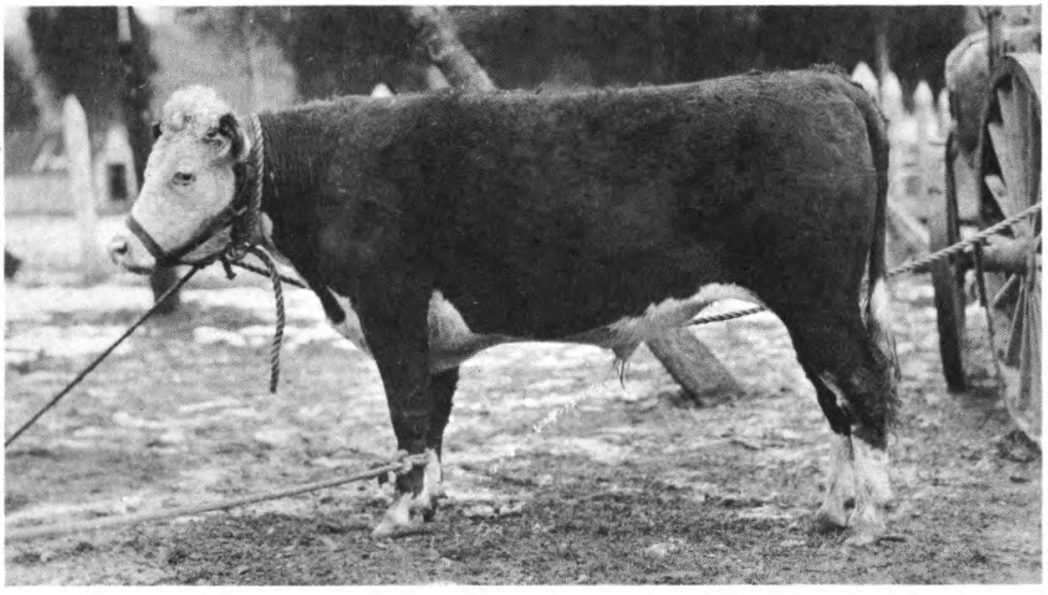


FIG. 43. Beef animal tied in position for stunning.

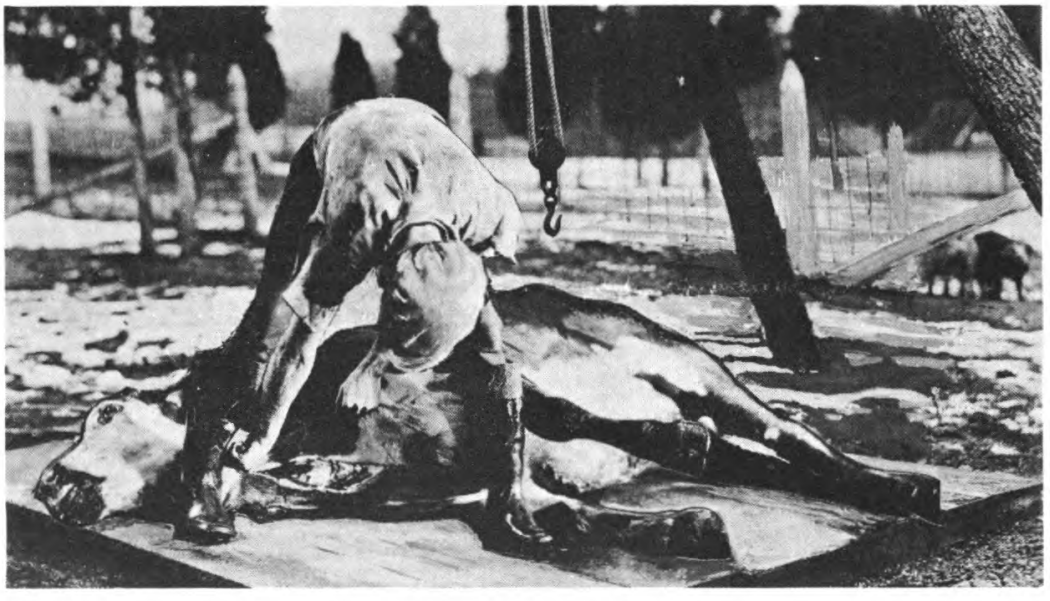


FIG. 44. Sticking.

the blade against the breastbone, and point the tip directly toward the backbone at the top of the shoulders just under the windpipe, and cut forward toward the head. This will sever ample arteries and veins to facilitate free bleeding.

After the animal is stuck, place your foot on the animal's flank and alternately lunge forward on this foot and then pull back on the tail in order to speed up the bleeding materially.

AVERAGE PERCENTAGES

(Certain Parts of Carcasses of Full-fed Hereford Steers[1] Classified According to Fatness and Average Weights of the Animals and Carcasses)

Steers, carcasses, and parts	Data for carcasses containing indicated proportions of fat[2]					
	12 to 15.99 %	16 to 19.99 %	20 to 23.99 %	24 to 27.99 %	28 to 31.99 %	32 to 35.99 %
Steers ..... number..	4	8	5	11	6	2
Final feed-lot weight ..... pounds..	604	748	769	809	883	972
Live weight at slaughter ..... do....	593	723	740	789	850	944
Empty-body weight ..... do....	557	679	711	751	832	918
Chilled carcass weight ..... do....	342.0	425.5	433.8	477.1	533.1	603.0
Parts of carcass—per cent of empty-body weight:						
Forequarters ..... per cent..	31.06	31.54	31.19	32.14	32.58	33.22
Prime rib cuts ..... do....	5.15	5.36	5.36	5.75	5.91	6.29
Chucks ..... do....	16.66	16.73	16.18	16.29	16.73	16.39
Plates ..... do....	6.67	6.98	7.22	7.82	7.91	8.45
Foreshanks ..... do....	2.60	2.43	2.32	2.17	2.16	2.05
Hindquarters ..... do....	29.11	30.41	29.25	30.77	31.00	31.70
Rounds ..... do....	13.32	12.99	12.50	12.02	12.03	11.09
Rumps ..... do....	2.93	2.93	2.83	2.97	2.99	3.01
Flanks ..... do....	2.30	2.99	2.92	3.55	3.65	4.15
Loin ends ..... do....	5.84	5.74	5.23	5.50	5.39	5.32
Short loins ..... do....	5.06	5.78	5.57	6.46	6.73	8.13

[1] The 36 steers ranged from approximately 11 to 17 months of age at slaughter.
[2] Based on ether-extract content of right side.
SOURCE: AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

PERCENTAGE COMPOSITION OF EDIBLE ORGANS (BEEF)

	Water %	Protein %	Fat %	Ash %	Other constituents %
Liver	69.5	20.0	2.5	1.5	6.5
Kidney	77.0	16.5	3.5	1.1	1.9
Heart	77.5	16.0	3.5	1.0	2.0
Tongue	67.0	16.0	13.5	0.9	2.5
Brains	71.0	10.8	13.5	1.7	3.0
Tripe	80.0	8.0	8.0	0.9	0.5

SOURCE: AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

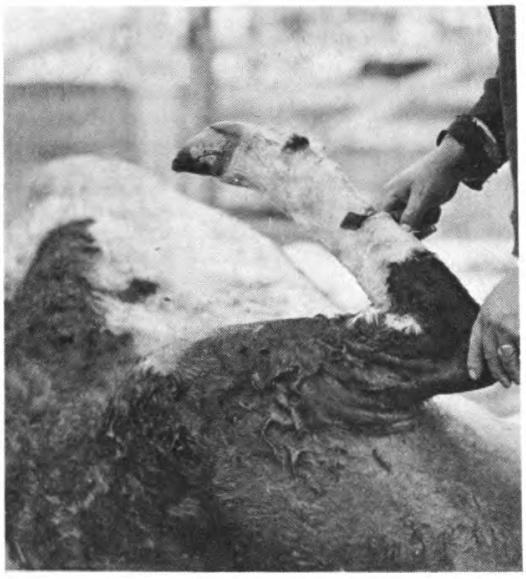


FIG. 45. Severing the tendons. Cut at a mark below the dewclaws.

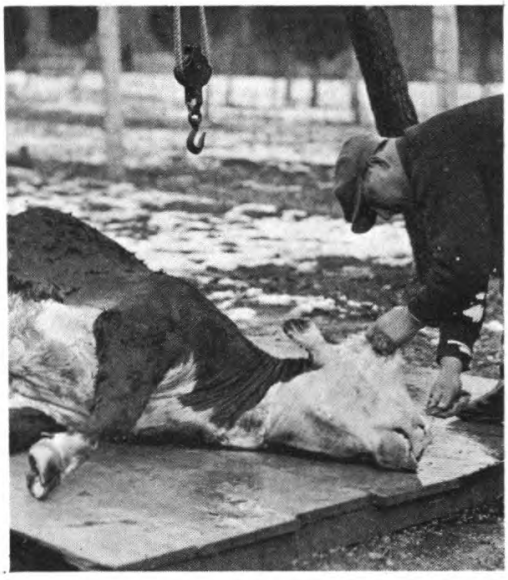


FIG. 46. Skinning the head—first operation.

FIG. 47. Skinning the head—the last operation before detaching it.

FIG. 48. Detach the head by cutting across the neck just back of the jaw.

If a block and tackle or hoist is available, untie the animal and quickly loop a heavy rope around the hind legs with a couple of extra half hitches and hoist the animal clear of the ground before sticking. In such a position a better bleed will be obtained. The hoisting can also be done after the animal is stuck on the ground.

FIG. 49. Propping the carcass in position with a pritch.

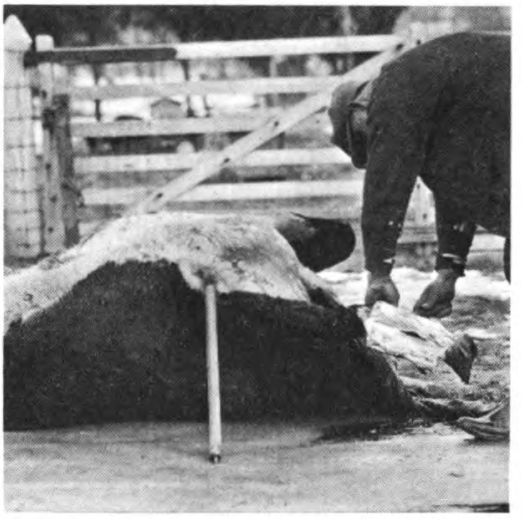


FIG. 50. Skinning the foreleg.

FIG. 51. Freeing the shank and hoof.

FIG. 52. Skinning the hind shank.

SKINNING AND REMOVING HEAD

The hide is a valuable by-product of a beef animal, and care should be taken in skinning it from the carcass and in handling it prior to tanning. A smooth, clean job of skinning should be done and no meat should be left on the hide. The treatment of hides and their ultimate use is given in Chapter IX, "Handling Hides and Skins." Start skinning at the head, cutting back of the poll, thence to the nostril on the left side of the head along the line of the eye. Skin the side of the head and a short distance down the neck. Turn the head up on its base to finish skinning it.

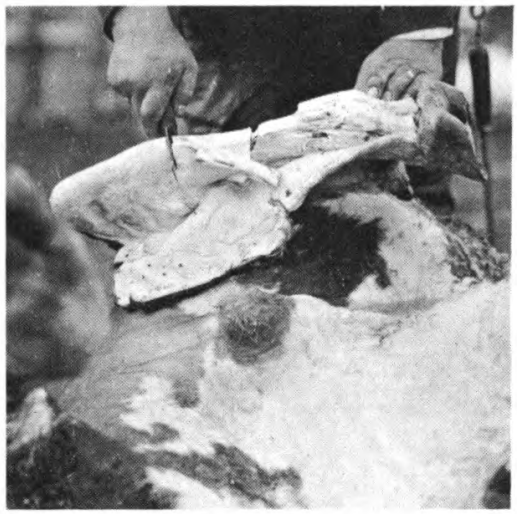


FIG. 53. Removing hind shank at lower hock joint.

FIG. 54. Skinning the thigh.

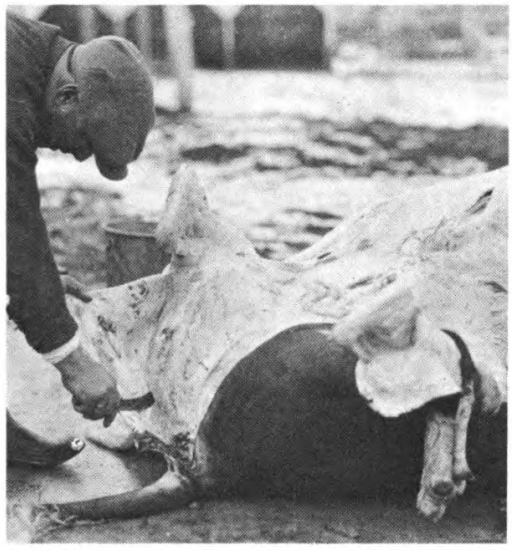


FIG. 55. The thigh is only partly skinned before hoisting the carcass. It is more convenient to complete the skinning when hoisted, and it is also conducive to cleanliness.

FIG. 56. Opening a line on the hide from the brisket to the tail.

Now grasp the head by the lower jaw and unjoint it at the atlas joint, which is the first joint back of the head. Make a cut across the neck just behind the jaws. A slight twist of the head will unjoint it from the neck after the muscles and connective tissue have been severed.

Skinning the Carcass

Prop the carcass squarely on its back with a block of wood, a stick sharpened at both ends, or a pritch. Split the hide over the back of the forelegs from the dewclaws to a point 2 or 3 inches above the knee. Skin out the shank and remove it just below the knee. Be sure to pull the hide back on both sides of the shank, then saw through the shank bone just below the lower joint. After some practice it is easy to cut through this straight joint with a knife.

Cut across the hind leg at the joint below the hock, severing the tendons to permit the leg to relax. Split the hide from the dewclaws to the hock and up over the rear of the thigh to a point from 4 to 6 inches back of the cod. Skin the hock and shin and sever the leg at the lowest joint of the hock. In splitting the hide over the thigh, the knife should be turned down flat, with the edge pointed outward and a little upward to avoid cutting or gouging into the lean of the round. The inside of the thigh may be skinned well down but the outside should not be skinned until after the carcass has been raised. Before hoisting the carcass, split the hide down the middle of the belly from the brisket to the tail and then skin back from this line until the side is well started.

The next, and the most difficult, part of skinning is known as "siding." The skinning knife should have a smooth, keen edge. Grasp the handle well up toward the blade and hold the blade flat against the surface of the hide, which must be stretched tightly. This will avoid cuts and scores on the flesh. In removing the hide, keep the blade turned slightly toward it in order to avoid gashing the flat muscle covering the abdomen, or thin "fell" membrane which lies between the meat and the skin. This membrane serves to protect the meat from drying out and from the attack of molds. The carcass should be sided down as far as possible. It is easier to do this in the present position than to delay the siding until the carcass is hoisted.

The appearance of the carcass will be improved if all blood spots are wiped from the surface during the skinning operation. A bucket of warm water and a clean cloth are needed for this purpose. The cloth should be wrung out so it contains as little moisture as possible.

Opening the Abdominal Cavity

Open the carcass down the midline by starting the incision large enough for entrance of the hand just back of the breastbone. Point the knife upward on the outside of the abdomen, the hand and

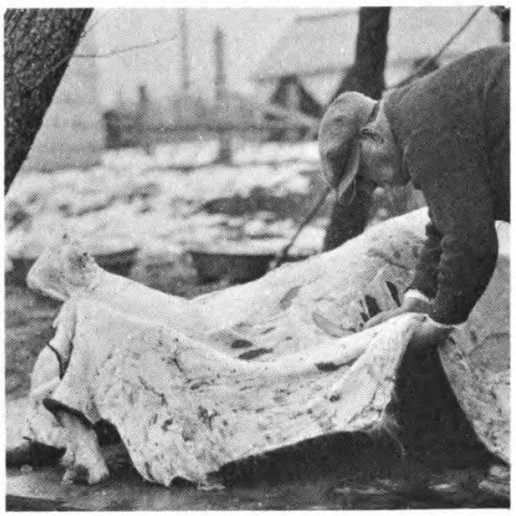


FIG. 57. Siding is the most difficult part of the skinning operation. Care should be taken to avoid gashing the flat muscle covering the "fell" membrane. The hide is held with the hand on the outside, for both convenience and cleanliness.

FIG. 58. Opening the abdominal cavity.

FIG. 59. Sawing the breastbone.

FIG. 60. The pelvic bone divided.

handle of the knife inside, cutting from this point all the way down the midline of the carcass to a point near the cod or udder. Cut through the abdomen carefully so as to avoid puncturing the paunch or intestines and protect them from the knife blade with the left hand. Cut through the brisket, exposing the breastbone, and saw through the latter. Loosen the windpipe and gullet, but do not

cut them off. Saw or split the pelvic bone, which is exposed by cutting through the muscle midway between the hind legs. Remove the caul fat.

Hoisting

Make an incision between the large tendons and the hock. Between the tendons and shank bones insert the beef tree or spreader. Now raise the hind part of the carcass to a height convenient for skinning the rump and tail. Cut through the hide on the underside of the tail. Sever the tail bone at a joint near the base and pull it out of the hide. Skin the rump on each side of the tail. Hoist the carcass a little higher now and skin the hide from the hindquarters. The hide may be removed from the thighs by pulling and jerking, or it may be "beaten" off by striking the hide with the back of the cleaver. If the hide does not yield readily, it can be loosened with the knife. As in siding, one should be careful to avoid removing the fell with the hide. Dip a clean cloth in hot water, wring it out, and wipe the hocks and hindquarters to clean off blood and other debris.

Next, loosen the rectum by cutting around it. After the rectum is cut free, tie it off with heavy twine and then work it loose from the backbone. Leave the kidneys and fat in which they are imbedded in the carcass. Let the rectum and the intestines drop down over the paunch. Now, cut the liver from the intestines to prevent the gall bladder breaking and fouling the liver. Then grasp the connective tissue of the gall bladder with the fingers and pull the gall bladder loose. Wash the liver thoroughly in cold, fresh water and hang it up to drain and cool. Pull down on the paunch to tear it loose from the carcass and let it fall into a tub or other container.

Hoist the carcass until it clears the ground. Cut out the diaphragm (the sheet of muscle which separates the heart and lungs from the stomach and intestines), but allow the muscles of the diaphragm to remain attached to the carcass. Take out the heart, lungs, and gullet. Wash the heart and hang it by the small end to drain. Complete skinning by removing the hide from the shoulders.

Splitting the Carcass

The carcass is now ready to be split down the center of the backbone. In commercial slaughterhouses this is done with a cleaver, but most people can do a better and smoother job with a saw. After the carcass is split, it should be washed completely with clean, tepid water. Move each foreleg up and down several times, to aid in draining the blood from vessels in the shoulders. Trim off all the ragged edges over the carcass to improve its appearance.

FIG. 61. Opening the hide on the underside of the tail.

FIG. 62. Pulling the tail out of the hide.

FIG. 63. Skinning the outside of the thigh (rump).

FIG. 64. Pulling the hide from the thighs.

FIG. 65. Loosening the offal.

FIG. 66. Removing the offal.

FIG. 67. Removing the heart, lungs and gullet.

FIG. 68. Removing the hide from the back.

FIG. 69. Sawing the backbone.

FIG. 70. Splitting the bones in the neck with an ax.

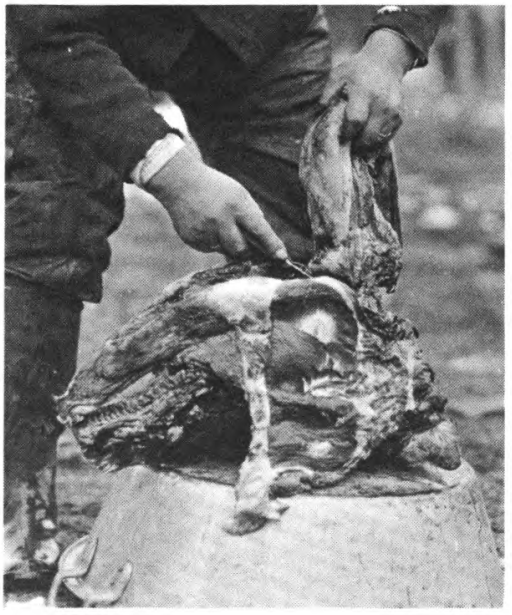


FIG. 71. Removing the tongue.

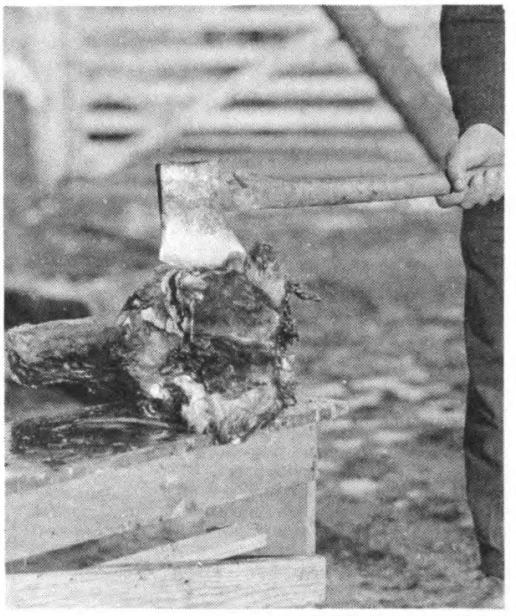


FIG. 72. Splitting the skull to remove the brains.

Chilling

Under farm and home conditions it is best to shroud the carcass to protect it from dust and dirt during the chilling process. This can be easily done with clean muslin cloth. Immerse two pieces in hot water, wring them out and cover each half of the carcass, pinning them tightly. This will smooth out the fat and also bleach it. The carcass should now be hoisted high enough to protect it during the chilling period. Quick and complete removal of animal heat is essential to prevent spoilage. A beef carcass should be allowed to hang from 12 to 24 hours, or at least long enough to cool, before being cut up. Chilling is best accomplished at 34 to 38°F. As previously stated, farm and home butchering is generally done in the late afternoon and the carcass is permitted to chill overnight. However, the carcass should not be permitted to freeze immediately after slaughter, since the formation of an outer layer of ice will prevent the proper elimination of animal heat from the thicker portions of the meat.

If farm and home conditions are not too favorable for proper chilling and ripening of the meat, the carcass should be placed in a chilling room at a local cold-storage plant. The carcass should be thoroughly chilled, however, before it is cut up, as it is impossible to make attractive cuts where the meat is not thoroughly chilled.

When meat is to be used fresh, the best meat is obtained when the beef is allowed to ripen. This will tenderize the meat and also add to its flavor. Ripening of beef is discussed under "Fresh and Seasoned Meat," page 10, in Chapter I.

Removing Tongue and Brains and Stripping Fat from Offal

To remove the tongue, place the head face down. Cut along both sides of the jawbone, loosening the tip and cutting all connections back of the base. A hatchet or cleaver is sometimes used to cut the bones at the base of the tongue. Allow the fat to remain attached to the tongue. Wash the tongue in clean, cool water and scrape it from tip to base. When it is thoroughly cleaned, hang it up by the tip to drain and cool. Saw or split the skull and lift out the brains. Trim the fat from the intestines and paunch as it can be rendered and used in making soap or sold as tallow.

Cleaning the Tripe

The first and second stomach of a beef carcass, properly cleaned and processed, can be used as food. It is known as tripe. Cut off these two stomachs and empty their contents by turning them inside out. Then wash them thoroughly in several waters, making sure that they are perfectly clean. Place in scalding water, approximately 150°F., for 10 or 15 minutes and then remove the inner lining by scraping. Continue scraping until the inner surface is very white. Processing tripe for food is discussed under "Meat Products and By-Products," page 271, Chapter XIV.

Slaughtering Calves

Veal is the dressed carcass of a calf between 1 and 3 months old, weighing from 75 to 150 pounds. The same general procedure in butchering, skinning, and eviscerating cattle can be followed for calves except the animal should not be kept off feed for longer than 6 to 8 hours before butchering; but during this time the calf should have plenty of clean, fresh water. Calves produced by beef cattle furnish the most desirable veal, as the calves are blockier in form and more heavily muscled. However, calves from dairy cattle are also used for veal.

Stun the calf before sticking, as in cattle, but the blow need not be too heavy. Butchering is made easier if the carcass is hoisted to a convenient height before skinning. Wash the hide and split it from head to tail, following the middle line of the belly. If the carcass is to be cut up at home, the hide may be removed at once, as the carcass can be skinned more easily while it is still warm. With a sharp skinning knife cut open the hide, then "fist" it off. Eviscerate and then split the breastbone and pelvis, as described for cattle. If the carcass is to be shipped or transported some distance, the hide should not be removed, for it preserves the light color and prevents the carcass from drying out.

A carcass dressed with the hide removed dries out quite rapidly. When the hide is removed, rapid drying can be prevented to some extent by draping and spreading the caul fat over the hindquarters. The caul fat is the thin sheet of membrane extending from the stomach over the intestines.

VII

BUTCHERING SHEEP AND LAMBS

The ease with which lambs and sheep can be dressed makes them a convenient source of fresh meat for family use. Lamb is the flesh of young sheep. Handy-weight 25- to 45-pound lamb carcasses yield comparatively small cuts. The entire carcass is small enough so that with home refrigeration a family can consume the meat before spoilage occurs. Portions of lamb can also be frozen or canned. Some cuts can be cured satisfactorily. It can be kept as an emergency food reserve or as a source of variety in the diet.

A lamb carcass chills quickly and cures easily. Lambs generally dress out about 50 per cent, which means that an 80-pound lamb will make approximately a 40-pound carcass. The trimmed leg roasts from a 40-pound carcass will weigh about 6 pounds each; and the shoulder roasts, about 5 pounds apiece. There will be about 7 pounds of breast and neck and 8 pounds of loin and rib to be roasted or cut into 30 medium-thick chops.

The United States Department of Agriculture tells us that all these cuts are normally tender enough to be adapted to cooking in any of several ways. The shoulder and even the breast may be oven-roasted if that method is preferred to braising the breast with vegetables. Cold roast lamb is an excellent filler for sandwiches, and the leftovers from any cooked lamb can be utilized in many tasty combinations.

Many families who were formerly not familiar with lamb now enjoy its characteristic flavor and have included this fresh meat in their regular diet. The desirability of lamb as a meat for home use depends on four principal factors, as does that of other meat. These are the breeding of the animal, how and to what extent it has been fed, the age at which it is slaughtered, and the method of handling the meat.

AVERAGE PERCENTAGES

(Of Certain Parts of Lamb Carcasses Classified According to Fatness)

Carcasses and parts	Data for carcasses containing indicated proportions of fat [1]		
	Under 20%	20 to 34 %	35% or more
Carcasses ..... number..	13	19	10
Average weight of chilled carcass ..... pounds..	21.9	34.4	47.5
Trimmed legs ..... per cent..	30.17	25.60	26.14
Rib cuts (9-rib) ..... do....	15.31	16.83	17.92
Shoulders (3-rib) ..... per cent..	19.73	19.53	18.80
Loins ..... do....	7.64	9.08	9.78
Neck ..... do....	3.89	3.28	2.94
Breast ..... do....	15.32	15.36	14.83

[1] Based on ether-extract content of edible portion.
SOURCE: AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

PERCENTAGE COMPOSITION OF EDIBLE ORGANS (MUTTON)

	Water %	Protein %	Fat %	Ash %	Other constituents %
Liver	71.26	19.38	3.90	1.22	..
Kidney	78.96	15.88	3.52	1.20	.22
Heart	69.80	16.88	11.54	1.12	.46
Tongue	69.46	14.50	14.71	1.21	.17
Brains	80.24	10.38	6.92	1.30	..
Tripe	..	..	..	..	..

SOURCE: AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

LAMBS SELECTED FOR SLAUGHTER

Lambs of the so-called mutton breeds are generally more suitable for meat than those of the breeds bred primarily for wool production. Lambs of the mutton breeds will fatten more readily, dress a higher proportion of carcass to live weight, and yield meatier roasts and chops.

A high degree of finish or fatness is not essential for a lamb that is to be slaughtered for home use. One that is moderately well fattened and making rapid growth should produce a carcass having tender, desirable meat.

The term "mutton," as commonly used commercially, applies to the flesh of older sheep, that is *lives* (over 12 months of age) and *wethers* (over 18 months of age). Such meat, especially that from well-fed sheep, though frequently less tender than the meat from the younger lambs, also is suitable for family use. Be sure that sheep and lambs selected for slaughter are thrifty and healthy. Slaughtering equipment (page 58) and care before slaughtering (page 64) have been discussed previously. However, a bench, box, or even a clean floor will serve as the place on which to kill and dress a lamb; nevertheless, a V-shaped trough of proper height is very convenient, if much lamb or sheep slaughtering is to be done.

Twenty-four hours before they are killed lambs should be penned up in order that the fleece will be dry. It is difficult to keep the wool from touching the carcass at times during dressing, but the drier the fleece the cleaner the carcass will be. During this penned period, no feed but plenty of clean, fresh water should be available. A lamb with a full stomach is harder to butcher than one with an empty stomach.

Naturally, a lamb should be handled carefully and gently before slaughter. Pushing it around and grabbing it by the fleece will cause a bruised and unattractive carcass. Such meat is not only unattractive, but has poor keeping quality. Quietly and carefully place the left hand under the throat and the right hand at the tail head.

Sticking and Stunning

A lamb should be held or suspended in such a manner that the blood will not run into the fleece after the animal is stuck. Place the lamb on its side. If no attendant is available to hold the legs, tie the two front legs to a hind leg to prevent struggling. An easier and cleaner job of sticking can be done by tying the hind legs together and suspending the lamb from a beam, limb of a tree, or some other stout support about 7 feet from the ground. In the left hand hold the lamb's nose, being careful not to shut off breathing. Stretch out the neck. Hold a sharp-pointed knife in the right hand with the cutting edge away from the neck bone. Push the knife through the neck close to the neck bone just behind the angle of the jaw and below the base of the ear. Cut out at right angles from the neck. If the knife was not inserted close enough to the neck bone to lift up and sever the main arteries and veins, cut back to the bone. In slitting a lamb's throat, the cut can be made either away from or toward the neck bone.

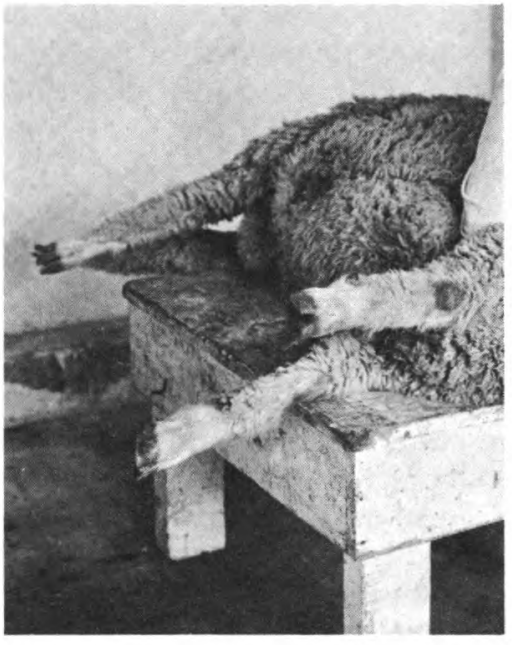


FIG. 73. Sticking a lamb on a bench. Pressure from the right knee holds the lamb in position.

FIG. 74. Sticking a lamb from a suspended position. With the left hand hold the head securely, to prevent its swinging.

FIG. 75. Stunning a lamb. Pull the head up and back with the left hand and push down hard with the heel of the right hand.

After the throat is cut, the neck should be broken. Grasp the nose with the left hand and the wool, on the face between the lamb's eyes, with the right. Pull the nose up and back and push down hard with the heel of the right hand on the lamb's face. This should easily break open the big atlas joint at the base of the head, if the muscles next to the neck bone were severed in cutting the throat. Permitting the lamb to struggle promotes bleeding. For this reason, holding the lamb is preferable to tying.

Skinning the Legs

After the lamb is well-bled, place it on a table, a platform, or a clean floor for skinning. The method of skinning described here is the easiest for the beginner. To open the pelt remove a narrow strip of skin from the front of the front legs and from the back of the hind legs. The pelt is then pushed or "fisted" off the brisket, belly, and flanks before the carcass is hung up.

K. F. Warner, formerly meat specialist for the United States Department of Agriculture, tells beginners to stand at the side of a lamb and hold the front leg between the knees while leaning away, so the leg is stretched tightly. Then below the lamb's knee to the hoof head raise a narrow strip of pelt. Extend this opening in the pelt from the point below the knee to a point well in front of the brisket. Be careful not to cut too deeply or through the paper-thin protective membrane, or fell, that covers the meat just underneath the pelt. To avoid cutting through the fell and into the meat, the beginner should "choke" the knife, hold it with the cutting edge up against the skin, rather than toward the meat, and cut with a short, curving wrist motion that swings only the point of the knife against the pelt. With the left hand, raise the pelt from the meat and hold it tight while the knife is turned against it.

Grasp the point or head end of the V-shaped strip of pelt over the brisket, formed by opening the fleece over the front legs, and pull it up and back over the brisket. If the pelt sticks so tightly to the brisket that the fat and fell begin to tear, stop pulling and begin "fisting."

Now hold the hind leg between the knees, in the same way as the front leg, and raise a strip of skin from a point below the hock along the tendon and into the hoof head. Extend the cut to a point just in front of the anus. Be careful to use the same rotary wrist motion to prevent the point of the knife from cutting into the choice leg muscles. Keep holding the leg between the knees and skin out the

FIG. 76. Opening the pelt over the front of the foreleg. Keep the edge of the knife against the leg rather than up against the skin.

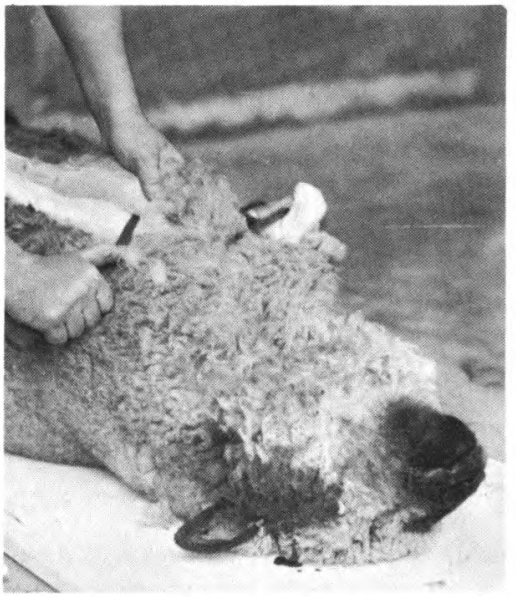


FIG. 77. Opening the pelt in front of the brisket. Slow, short strokes up against the pelt will prevent cutting down into the meat.

FIG. 78. Pulling the pelt over the brisket. Hold the pelt at the end and pull steadily.

FIG. 79. Unjointing the foot from the skinned hindleg.

hock and leg. Then unjoint the foot at the lowest joint or the one next the hoof. Be sure to unjoint the foot as described, so that the tendons will not pull out when the carcass is hung.

Slip the knife between the leg bone and the tendons to make an opening for the gambrel used in hanging the carcass. There are two tendons; so be sure to raise both, as one may not be strong enough to hold the carcass. Skin out the other hind leg. Now grasp the pointed strip of pelt and pull it back over the cod or udder as far as it will go without tearing the flesh.

Fisting the Pelt off the Carcass

Place the lamb back down on the platform, box, or bench on which you are working. Hot water and dry cloths should be available to wash and dry the hands when they become dirty. Clean hands are necessary to produce a clean carcass.

Begin "fisting" the pelt off the belly. This is done with a tightly clenched fist, taking care not to tear the thin membrane or "fell," which should be left upon the carcass to protect it. Be sure to wash the hands and arms frequently in clean, warm water while "fisting," to prevent soiling the carcass.

Clench the fist with the thumb on top of the first finger, which is used to lead the fist in under the pelt. Direct the motion and the pressure of the fist up against the skin. Push and work it away from the meat. Follow along with the left hand just above the right, grasping the wool and holding the pelt taut as the fist pushes against it underneath. Breaking through the fell and muscles of the carcass with the fist will produce an unattractive carcass but it will not be ruined. With little experience one can soon tell by the feel whether fisting is proceeding properly.

Fist in on one side of the brisket and loosen the pelt as far down as it is possible to reach conveniently. Now work down behind the shoulder but do not attempt to loosen the pelt along the entire side. Fist in on the opposite side of the brisket and repeat the operation. Usually the pelt sticks to the brisket, but sometimes it can be worked off from behind. Often the thumb can work it loose from each side. Occasionally a knife is required to cut the skin from the center of the brisket. Young, well-fattened lambs are skinned more easily than older, thinner sheep.

Loosen the pelt at the rear. To do this, stand between the hind legs and grasp the pelt with the left hand. Work the right fist down the center, over the cod or udder to the navel. Now push the hand

FIG. 80. Pulling the pelt free up to the cod or udder.

FIG. 82. Opening the pelt down the middle.

FIG. 81. Holding the pelt tight and fisting forward under the cod or udder.

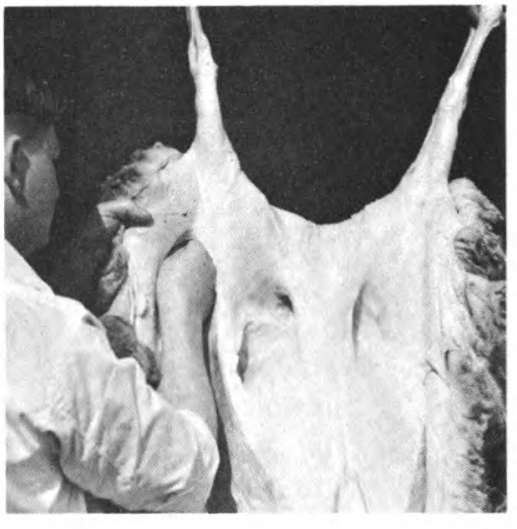


FIG. 83. Wedging in the fist up along the leg.

and arm sideways and free the pelt over the flank and inside of the hind leg. Here fisting is begun down the middle instead of at the side as in skinning the brisket. Fisting in this manner lessens the chances of getting beneath and tearing the flank muscles.

Removing the Pelt

After the legs have been skinned and the pelt fisted off the belly, insert a gambrel in the hind legs, between the tendons and the leg bones, and suspend the carcass. A hook or support 7 feet from the ground or floor is a good working height.

Cut the pelt open down the middle of the belly, cutting loose the navel. Hold the pelt tightly with the left hand, work the right hand around the stifle and then up the outside of the left leg. Change hands, or cross hands, and fist out the right hind leg. This will roll the fleece away from the clean carcass. Fist down past the shoulder, pull the skin free from the foreleg, and then fist out the side of the neck. Push the pelt free from the sides and fist off the rump. The rump may stick, so to free it work the pelt from both sides. Push up from underneath until the pelt hangs only by the skin fastened to the anus and tail.

At the lower end of the sheep's front leg is a true joint. This must be opened to cut off the pastern and foot of mature sheep. Up the leg from the true joint is a cartilaginous suture in the bone. With a sharp twist it can be broken apart at the suture joint in most lambs. With yearling lambs and with old sheep this suture joint will not break and the foot must be unjointed. It is customary to cut off the forefeet of lambs at this suture, which identifies the carcass as lamb. This break joint is taken as a definite indication of the age of the animal. Cut or nick the membranes on the side of the leg just over this lamb joint. Break the joint open where it has been cut by pressing the foot sideways. If necessary, the leg can be held against the knee in making this break.

While the pelt is still hanging to and stretching the tail, push the knife in beside and above the anus, cut clear around it and loosen the anus so that 10 or 12 inches of the colon can be pulled up and out of the body cavity. Tie the colon before it is dropped back into the body cavity so that its contents will not foul the carcass. Cut and pull the skin free from the dock and pull and fist it free from the back. It is usually possible to do this without any knife work and leave a smooth carcass.

Pull the pelt down the neck. Use the knife to free the pelt around the skull and over the face. Remove the head by cutting through the throat just back of the jaw, unjointing it at the atlas bone. Wash the carcass well with clean, warm water and wipe it dry with clean cloths wrung out in hot water.

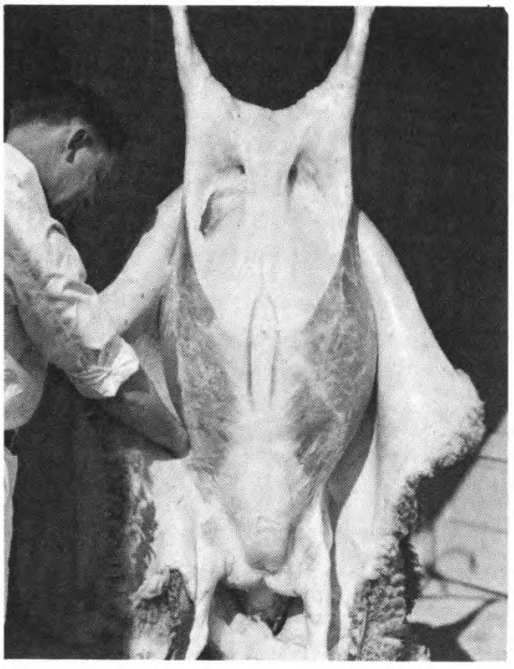


FIG. 84. Pushing the pelt away from the foreflank and shoulder.

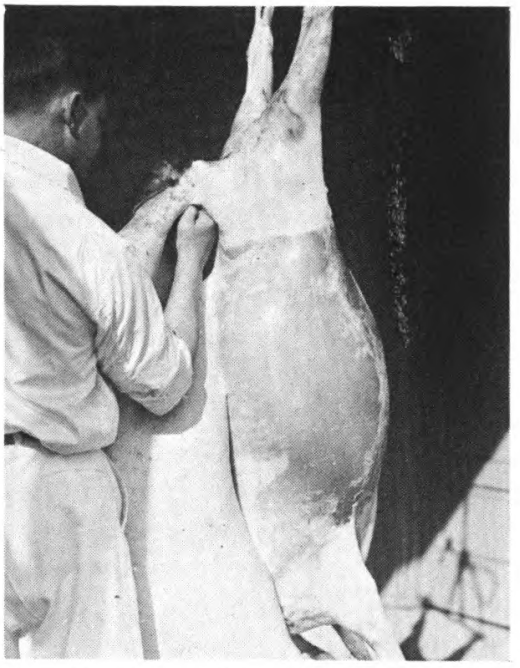


FIG. 85. Fisting the pelt free from the back. The next step will be to cut the pelt free from the dock.

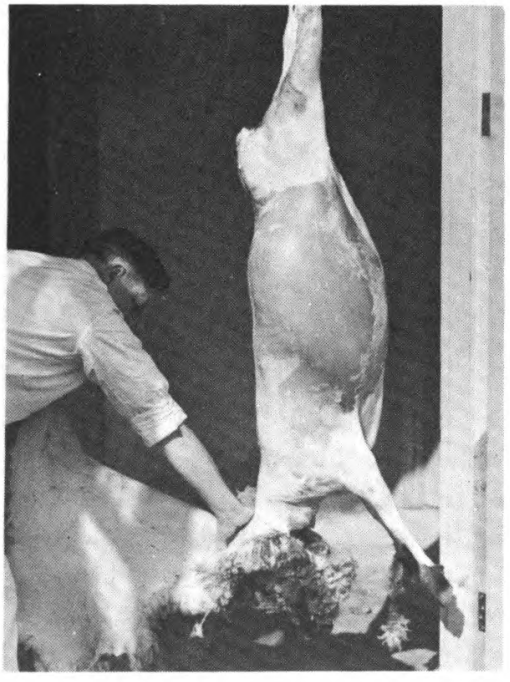


FIG. 86. Pulling the pelt free from the neck. This should be easily accomplished if the sides have first been fisted free.

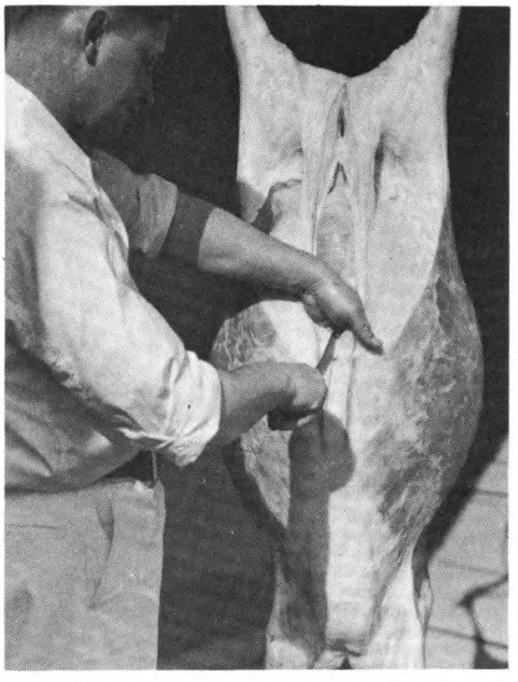


FIG. 87. Insert the fingers of the left hand inside the abdominal cavity to hold the internal organs away from the knife while opening the carcass down the front.

Opening the Carcass

Cut down the middle of the carcass from just below the cod or udder to the cartilage of the breastbone or brisket. Into this, the clenched fist grasping the knife is forced. The fist pushes away the paunch from the heel of the knife and prevents cutting into the paunch as the belly wall is ripped downward. Allow the paunch and intestines to roll out and hang. Reach in and locate the already loosened and tied colon and pull and work it down past the kidneys. Grasp and remove the bladder taking care not to split its contents on the meat. Roll out the paunch slightly and get a firm grip on it with the left hand where it joins the intestines. Work the right hand into the body cavity, up the ribs and behind the liver. Tear it loose where it is attached near the right kidney. Use care in removing it, for the liver is a choice product. Still keep a firm hold on the viscera, work the right hand under the paunch along the diaphragm and pull and push the organs up and from the carcass. Tie the gullet with a stout cord where it enters the chest cavity; then cut the paunch free by severing the gullet below the cord. Tying prevents the digestive contents from spilling over the carcass when the gullet is cut. A helper will be needed in making the tie and cutting the gullet. Drop the offal into a clean container for later inspection.

Next split the breastbone. If the animal is over 1 year old, a saw may be required as well as a knife. To remove the pluck (heart and lungs), cut the white part of the diaphragm. Then cut loose the pluck on each side of the brisket, loosen the large blood vessels along the backbone and pull the pluck down and out.

Care of Internal Organs

Remove the gall bladder from the liver by pinching under the neck or small end of the bladder with the thumb and forefinger. Tear or cut the upper or smaller end free and pull gently to peel out the main body of the bladder. The bladder can also be cut out with a knife. In removing the gall bladder precaution should be taken not to puncture or cut it, for then the gall will run over the liver and cause a bitter flavor. After the gall bladder is removed, wash the liver in clean, cold water to remove any possible bitter flavor.

After the tongue is cut from the head, split the skull and remove the brains. The liver, heart, and tongue should be carefully washed in clean, cold water and hung up to chill. The caul fat if clean may be used in cooking. Cut the small intestines from the stomach

and remove the fat. They are easily separated from the fat by pulling carefully with the hands. They may be cleaned, salted and used for sausage casings. The fat is usually used for soap stock.

Now the freshly slaughtered carcass is ready for chilling. It should be chilled to a temperature above freezing and below 40°F. as soon as possible. Fresh meat, in commercial establishments, is held at about 34° for storing and ripening. (See section on "Fresh and Seasoned Meat" in Chapter I.)

FIG. 88. **Removing the heart and lungs after splitting the brisket.**

VIII

DRESSING GAME ANIMALS

Relatively few people realize that venison and other game meats will give any family budget a much needed lift. It is surprising how few persons in this country have ever eaten game.

In more recent times game has been hunted primarily for sport, and the emphasis has been on recreation rather than on obtaining food. Therefore, game meats have not been utilized to the fullest possible extent in supplementing the domestic meat supply, and little time has been devoted to their preparation and cooking.

Game meats should be used more often and a taste for venison and wild fowl cultivated. This will increase variety in the diet with practically no increase in cost. Game is not expensive if one shoots it, but if it is badly dressed or cooked improperly it is a total loss.

Considerable game meat is wasted each hunting season through spoilage because some hunters are ignorant, indifferent, or lazy when it comes to processing their kill. Warm, freshly killed game requires even more prompt attention to bleeding and chilling than domestic meat animals. Spoilage starts quickly, especially in the muscles that have been torn or bruised by bullets.

Big Game

Deer, elk, moose, antelope, mountain sheep, or other big game animals should be stuck and bled promptly as soon as they are dropped by the shot of the hunter. Hanging and dressing the carcass will speed up chilling. How completely the carcass should be dressed, cut up, and packed for transportation depends on the distance it is to be transported, the time involved in transportation, and the temperature.

If the game is taken to camp or hauled home quickly, a better job of butchering can be accomplished because the carcass can be hung up properly and more tools will be available to do the work. How-

ever, as soon as possible after the deer is killed it should be "field dressed,"—that is, the viscera, lungs, heart, and liver removed. Bacteria in the abdominal cavity of any animal will soon cause spoilage; therefore the contents of the stomach and chest should be emptied quickly. One advantage in taking the carcass home is that your neighborhood butcher or one at the cold-storage locker plant can do the job for you; but if you do it yourself in the woods, proceed according to the following directions.

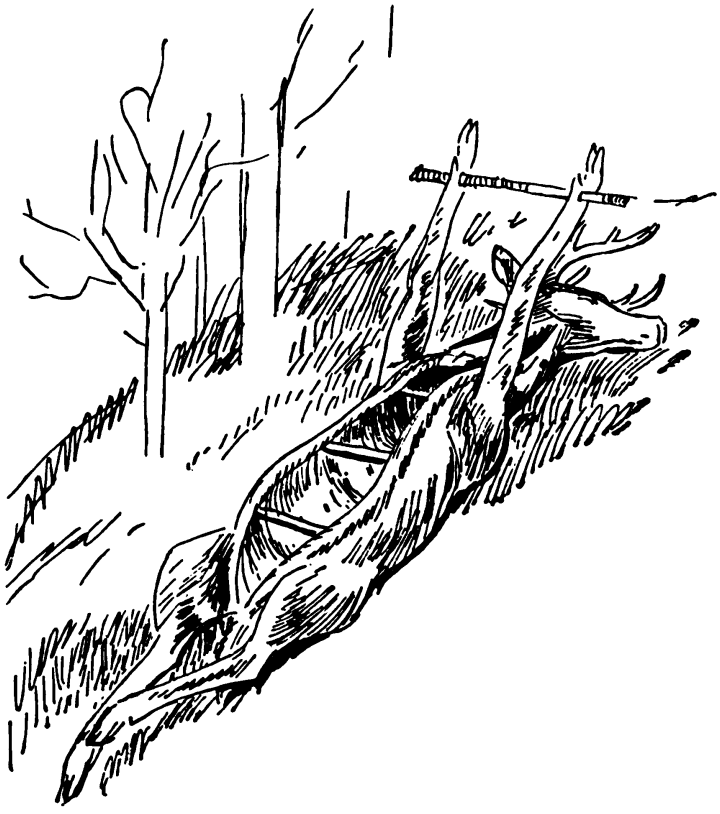


FIG. 89. Open chest cavity by spreading with a stick. Drain off blood and wipe with a clean cloth.

DRESSING DEER ON THE GROUND

As soon as the animal is shot, unless you wish to save the head for mounting, bleed it by cutting the throat. If possible, turn the carcass with the head downhill so that it will bleed freely. There are two ways of dressing a big game animal. One is with the carcass lying on the ground, the other is hoisting it off the ground. Some hunters carry a very light block-and-tackle so they can hoist the animal.

To open the body cavity of a deer lying on the ground, insert

the knife near the breastbone. Locate the lower end of it and slit the skin. Make a small opening, then insert two fingers beneath the hide and back of the knife to guard it from piercing the stomach and intestines when the knife is advanced toward the tail of the animal. Open the carcass from throat to crotch. When you cut to the genitals, stop. Remove the knife, cut around the genitals, and pull them out. Then cut out the rectum. A stout hunting knife or a belt ax may be used to split the breastbone. Be as careful as possible in preventing the hair from coming in contact with the meat. Now cut loose the organs in the pelvic cavity. Reach inside the carcass, down between the hip bones, catch hold of the large intestine, and pull it out and tie it off.

Now turn the carcass with the head uphill, cut windpipe and gullet free at throat. Hold these in the hand and pull backward, at the same time cutting free from the carcass any part that tends to hold. Remove the entrails to the base of the tail. If the carcass must be removed from the woods before cooling and quartering, leave the liver and heart in the body cavity. Open the chest cavity by spreading with a stick. Drain off blood and wipe with a clean cloth. Do not wash with water. Trim away all parts damaged by gunshot.

Butchering a Hanging Deer

After the animal has been bled, loosen the tendons in each hind leg. Insert a pole, 3¼ to 4 feet long and pointed on both ends. Then hoist the carcass with a block-and-tackle, or by the limb of a tree, a crossbeam, or a tripod erected for the purpose. At the hock joint cut around the skin on each hind leg. Run the knife down along the inside of each leg to the cod or testicles. Skin out the hind legs carefully, using the knife skillfully. Pull the tail out of the skin as far as possible and then cut it off. Proceed in the same manner as described for skinning and dressing calves. With a sharp knife held nearly flat against the surface and with the hide stretched tightly, remove the skin down over the sides with steady down strokes of the knife. "Fisting," will help separate the hide from the flesh on certain parts of the body. Some prefer as a matter of protection in transportation to leave the skin on the carcass. This is only advisable in very cool weather. If state laws permit, it is better to quarter the animal before moving. Eviscerate and remove the edible organs in the same manner as that described for cattle.

Remove the liver—there is no gall bladder—save the heart, liver, kidneys, and pancreas (sweetbread). They are delicacies and well worth all the trouble you may experience in saving them.

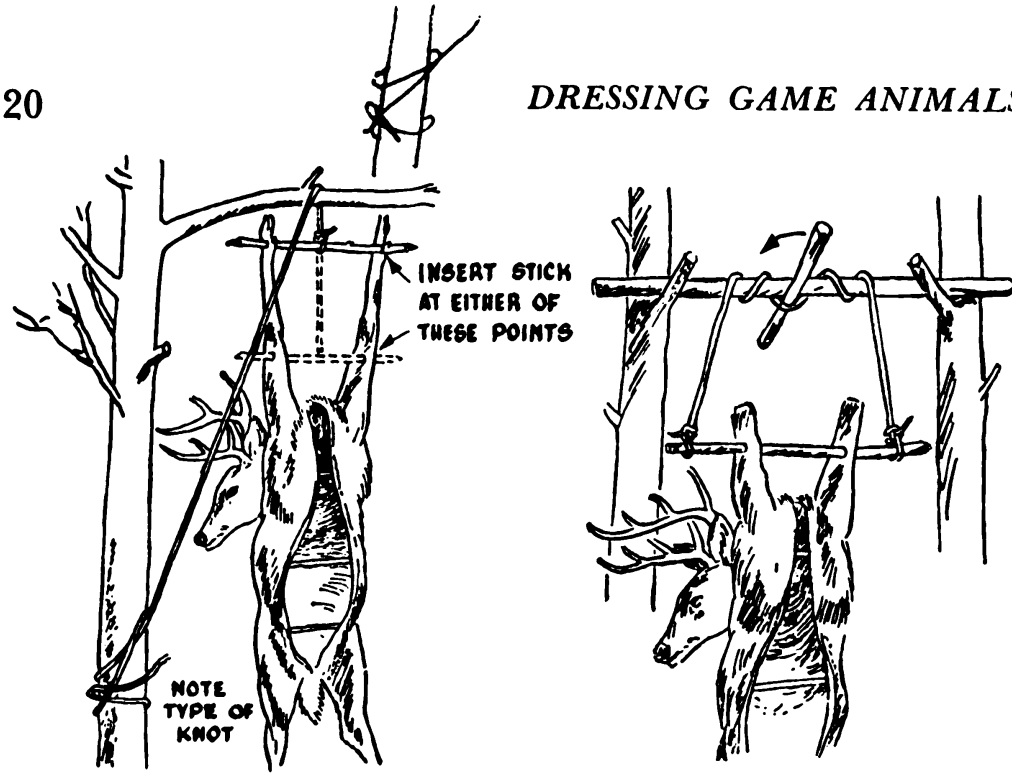


FIG. 90. A deer carcass can be hoisted with an improvised winch or a small block-and-tackle.

REMOVING THE TONGUE AND BRAINS

In removing the tongue from the head, place the head face down, cut along the inner surface of the lower jaw, lift up the tongue and cut it off at the base. A hand ax can be used to cut the bones at the base of the tongue. Allow the fat to remain at the base of the tongue. Wash the tongue well in clean, cold water and scrape it with a knife, from the tip to the base, then hang it up to drain and cool. Saw or split the skull and lift out the brains.

SAVING THE HEAD

If you plan on mounting the animal's head, a special method of treatment is necessary. The United States Forest Service recommends the following procedure: Do not puncture the skin; cut it around the body so as much as possible of the hide from the shoulder and brisket is included. Cut along back of neck and to base of antlers. Peel skin from neck and head, cutting ears close to skull. Exercise care in peeling skin from around antlers, eyes, and lips so that no holes or tears result. Remove all flesh and fat; salt well. After several hours, re-salt skin and turn flesh side out to dry slowly in shade. Take care that no folds are left while drying. Do not remove antlers from head except with a saw. A generous portion of skull should be included.

FIG. 91. Use the knife for fisting with hand on the handle (hand was moved forward to show the rear of the handle).

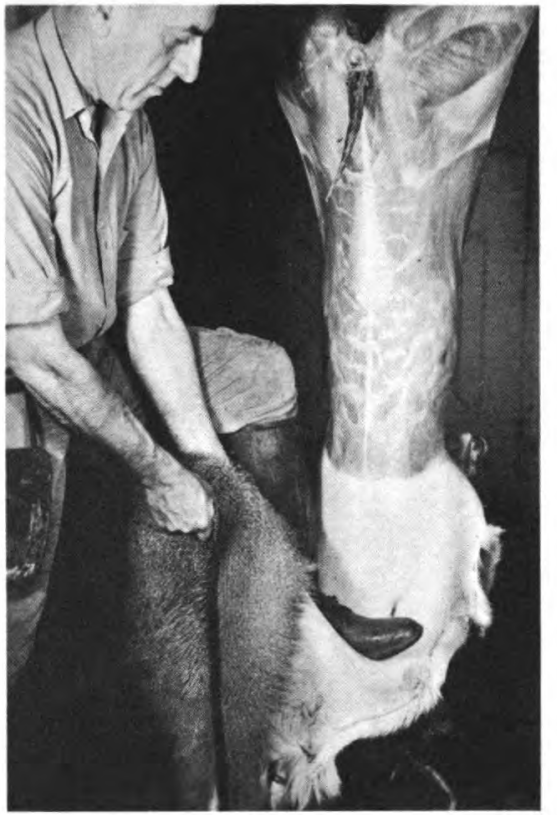


FIG. 92. The skin is pulled from the ribs and fisted (using the fist of the hand) from the shoulders. Use the body weight to pull the skin over the shoulders and neck.

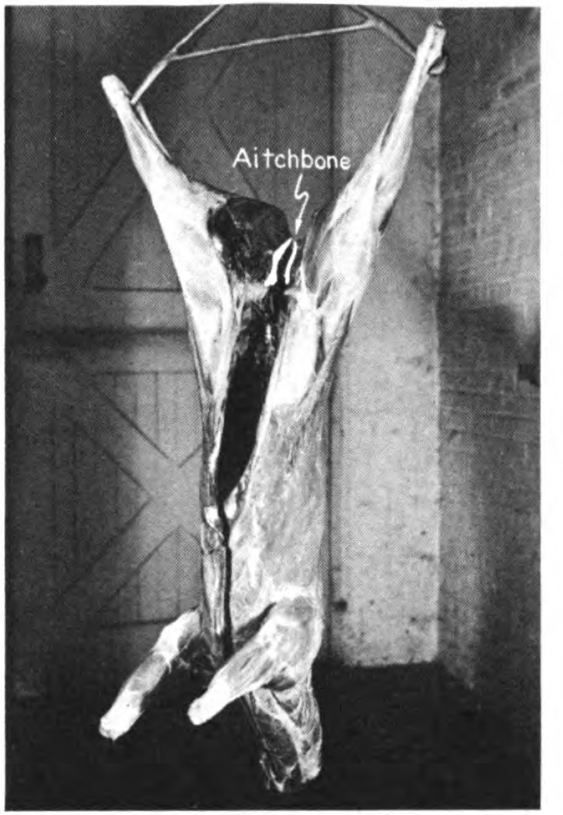


FIG. 93. Split the carcass through pelvic and aitchbone (where the legs are jointed).

Small Game *

It is much easier to eviscerate and skin an animal while it is still warm than after the carcass has become cold. Rabbits, squirrels, woodchucks, and other small animals are generally disembowled in the field soon after they are shot. Tularemia (a disease of wild rabbits) which is transmissible to man, has given hunters and their wives considerable worry. There is no need for this if the proper precaution is taken. When a rabbit is bagged, pick it up in gloved hands. Slit the belly from the anus up to the breastbone. Grab the forelegs and head in one gloved hand and the hindquarters and legs in the other and dash out the entrails on the ground. Take a stick and stir through these to locate the liver. It if possesses a clear, dark, blood-red healthy looking color with no visible white cyst-like spots the size of a pea or smaller, the rabbit does not have tularemia. As a secondary precaution, however, the hunter should carry a small bottle containing a solution of Lysol or similar disinfectant in his hunting jacket and, after he has handled a rabbit, should pour some of this liquid in the palm of one hand and bathe his hands vigorously. If there were any tularemia germs on his hands, they have been destroyed.

Small game can be skinned in the field, in camp, or at home. Hang the carcass of a rabbit or woodchuck up by the right hindleg on a nail or a hook inserted near the hock joint between the tendon and the bone of the leg. Remove the head and front feet. Next cut off the tail and sever the left hind foot at the first joint. All cuts should be made clean so as not to splinter the bone or make a rough surface on the meat. Then cut the pelt around the right hind leg at the hock. Slit the pelt on the inside of the leg to the root of the tail. The fat should be cut away from the pelt before this is pulled down over the carcass. Then with both hands firmly pull the pelt down off the carcass. Rabbits and woodchucks can be skinned in this manner, but opossums, raccoons, muskrats, and beavers are pelted differently. All these furs have some value, and care should be taken in skinning the animals and preparing the pelt for the raw fur market.

Whenever small game animals are skinned, remember that some of them, such as muskrat, woodchuck, beaver, raccoon, and opossum, have scent glands, and these should be removed as soon as possible. If they are left intact the meat will become tainted from the strong musky odor. These glands are located under the forelegs and along

* *Cooking Wild Game,* by Frank G. Ashbrook and Edna N. Sater, Orange Judd Publishing Company, Inc., New York, 1945.

the spine in the small of the back near the rump. They are generally pea-shaped, waxy or reddish looking "kernels." Avoid cutting these glands, or bringing them in contact with the meat. The degree to which they flavor the meat varies with the season, but in most fur animals they are always objectionable.

In the case of the cottontail and jack rabbit, these small, waxy-looking glands are located under the front legs just where they join the body. The same is true of raccoons—these so-called "kernels" or scent glands are located under the front legs and on either side of the spine in the small of the back. The woodchuck also has these glands in the form of red nodules under the forelegs. The muskrat derives its name from its scent or musk glands. They give off a characteristic pungent odor and, if cooked with the meat, impart a strong flavor. The large pair of musk glands lie under the skin on the lower part of the abdomen. They are light yellow and have a corrugated appearance. In addition, there are some small internal glands located in the inguinal region of the thighs, between the forelegs and between the shoulders on the back. They resemble small, yellow, fat bodies and are so inconspicuous they are overlooked by most people. As the breeding season approaches, the glands become more active and should be removed.

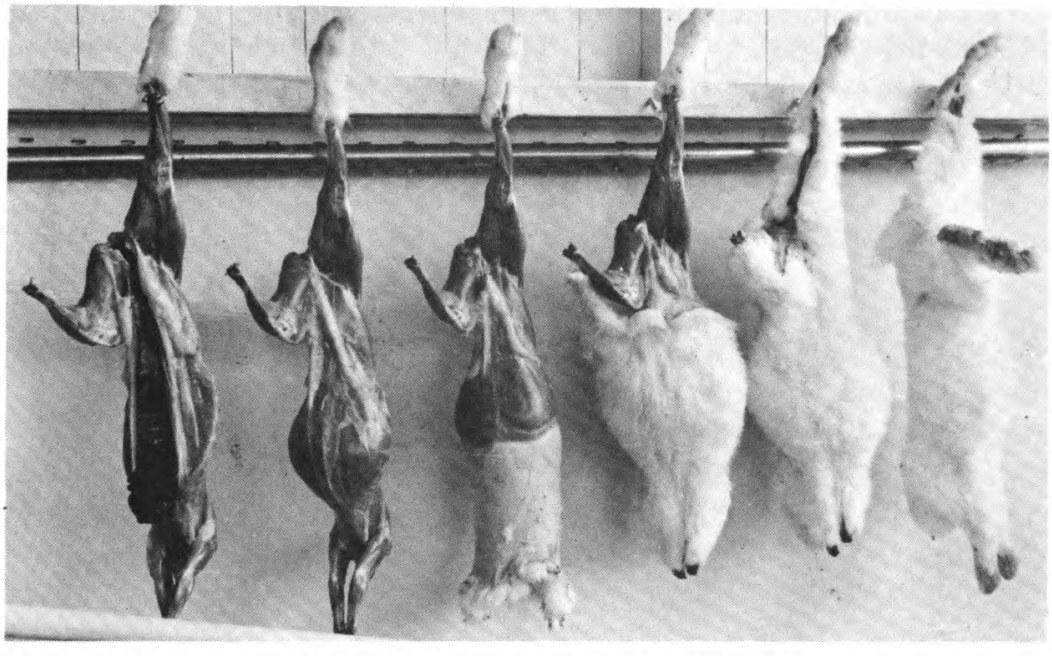


FIG. 94. Domestic and wild rabbits may be skinned in the same way. Steps (*right to left*): remove the head; cut off the tail, then free hind leg at the hock joint, and the front feet; then cut the skin just below the hock of the suspended leg and open it on the inside of the leg to the root of the tail, continuing the cut to the hock of the left leg; and carefully separate the skin from the carcass and start pulling it down over the animal.

IX

HANDLING HIDES AND SKINS

Hides and skins of animals are made into leather. Those from large and adult bovines are suitable for sale, harness, belting, or heavy leathers. Skins from small animals, such as sheep, goats, calves, deer, and antelope, are made into light and fancy leathers. While there are other commercial sources of hides and skins, the important ones are the usual domesticated farm and range animals.

The hides and skins of animals are valuable. The first essential for a satisfactory yield of good leather is a sound, clean hide or skin. Therefore, skinning should be done properly, without cutting or scoring the hide; and at the same time all the fat and flesh should be removed, for, if left on, they increase the tendency of the hide or skin to rot or spoil.

Preparation of the hide or skin may be begun as soon as it has been taken off the animal, drained, and cooled. Overnight will be long enough to allow the hide to lose its body heat. Remove dirt, blood, and any pieces of flesh by scraping the skin side with the back of a butcher knife and by careful trimming. Split the ears twice. Immediately wash both sides of the hide with clear, cold water and use a brush, scrubbing particularly the hair side to remove all dirt. Let the hide drain thoroughly to remove the excess water, and then begin to apply the salt.

When the weather is cold, hides and skins may be kept safely for some time without salting, though care should be taken to prevent them from freezing. During spring, summer, and fall, however, they must be salted promptly and thoroughly if they are to be made into sound leather and pay for the work of curing them.

Salting and Curing

Cattle and Horse Hides. Select a cool, clean place, preferably a cellar, garage, or barn floor free from draughts and out of the direct

sunlight. A floor with a slight slope and a drain is the best. Sprinkle on the space chosen a thin layer of clean crystal salt (about pea size) or ordinary salt of the kind used for salting meat. Spread the washed and drained hide, hair side down, over the salted area, being sure to straighten out all folds and laps. Sprinkle fresh, clean salt all over the flesh side of the hide, using nearly a pound of salt for every pound of hide. Be sure that all parts of the flesh side receive a sprinkling of the salt. Use plenty of salt and rub it in well along the cut edges, head, neck, legs, wrinkles, and the heavy portions.

If several hides are to be cured, pile them one upon another, hair side down, with the heads at one end. Salt each one as directed. Lay the hides one upon the other but do not drag them across the others, as this disturbs the salt on the hides underneath, causing unsalted spots and spoiled hides.

As the liquor accumulates it must be drained away to prevent damage to the hides on the bottom.

Properly salted hides will become firm and stiff in about 12 to 14 days. They are sometimes known as "salt firm" or "salt hard." The hides are now ready for bundling and shipping. Hides should not be bundled immediately after salting.

Horse hides are removed in practically the same way as cattle hides. They are graded almost entirely on the condition of the rear portion which covers the buttocks. Therefore, great care should be taken with this portion of the hide, which should be free of scores, cuts, and dragged spots. Tails and manes should be removed from the hides and sold separately.

FIG. 95. E[illegible] l separately and tied securely. A soft rope or line at least [illegible] swer the purpose. Never use wire. An individual [illegible] shipped requires more wrapping.

Calf and Deer Skins. The hide of a deer or elk is also valuable. Gloves can be made, and a vest or hunting jacket is not only practical but good looking.

After the skins have cooled, salt them in the same way as cattle or horsehides. A finer salt is more satisfactory, and it should be rubbed in well with the hands on neck, head, tail root, legs, and shanks. A wooden platform with a slight slope is excellent for salting calf, deer, lamb, and sheep skins. The brine that accumulates will drain away properly.

Sheep and Lamb Skins. Apply the salt in the same manner as previously described but use about one-half pound of clean fine salt to one pound of skin. Sprinkle it on by hand and rub it in. Be sure that every spot of skin gets this salt treatment.

Sheep and lambskins should be sent to market promptly. Do not hold them more than 4 or 5 days. They will heat, causing decomposition and loss in value. For the same reason, do not place more than ten pelts in one pile.

Keeping Cured Hides and Skins. Properly and thoroughly cured hides and skins other than sheep and lambskins may be bundled and safely kept for some time in a cool place. Fall, winter, and spring hides may be kept until May or June without undue deterioration. As a rule, however, it is inadvisable to keep hides and skins during the summer.

Having Hides Tanned

Ordinarily it is more economical to have hides and skins processed by tanners who are willing to tan one or more hides than to do the work at home. Some tanners tan only hides with the hair on for robes and coats; some also tan harness, strap, or lace leather; and a few tan sole leather. Some accept one-half of the hide in payment for tanning the other half; that is, if one sends a hide to be tanned, the tanner will send back one-half tanned into leather, and keep the other half to pay for his work. This is probably the best way for some farmers or ranchers to get their leather.

Hides and skins should be tanned only by experienced tanners. An inexperienced person cannot hope to make leather equal in appearance, or possibly in quality, to that obtainable on the market. However, some farmers and ranchers are able to make serviceable leather for most farm purposes by carefully following directions for home tanning of leather. If you desire information on the home tanning of leather, consult the references at the back of this book.

X

CUTTING THE CARCASS

There is no "best way" to cut a carcass. The choice depends on how the meat is to be used. If it is to be sold, the cuts should conform to local preferences. If the meat is to be preserved by freezing, each piece should be of a size and character suitable for convenient cooking. The methods described here show how to make the major cuts, and suggestions are offered for using them in order to produce the maximum amount of meat that can be preserved by curing, smoking, or refrigeration.

Pork

Pork carcasses are cut as soon as they are thoroughly chilled, usually within 48 hours after slaughter. It pays to do a neat job of cutting and trimming whether the meat is to be consumed at home or some is to be marketed. One derives a great deal of pleasure months later in unwrapping a neatly trimmed ham, shoulder, or bacon. After all, attractive pieces of meat on your own table are most desirable.

The cutting method prescribed separates the thick ham, loin, and shoulder from the thinner bacon strip, fat, and head. All the other pieces can be classified as trimmings. All trimmings, including the very small ones, can be used to advantage in making sausage, scrapple, headcheese, and other pork products.

Considerable research for improving methods of home butchering, curing, and meat preservation has been conducted by the Morton Salt Company. Their objective has been to remove all guesswork and to make the job easier and certain. Here is a precise and easy procedure recommended by this company for cutting up a hog carcass.

Place the cold side of pork, skin down, on the table and start cutting it. Saw at the shoulder through the third and fourth ribs

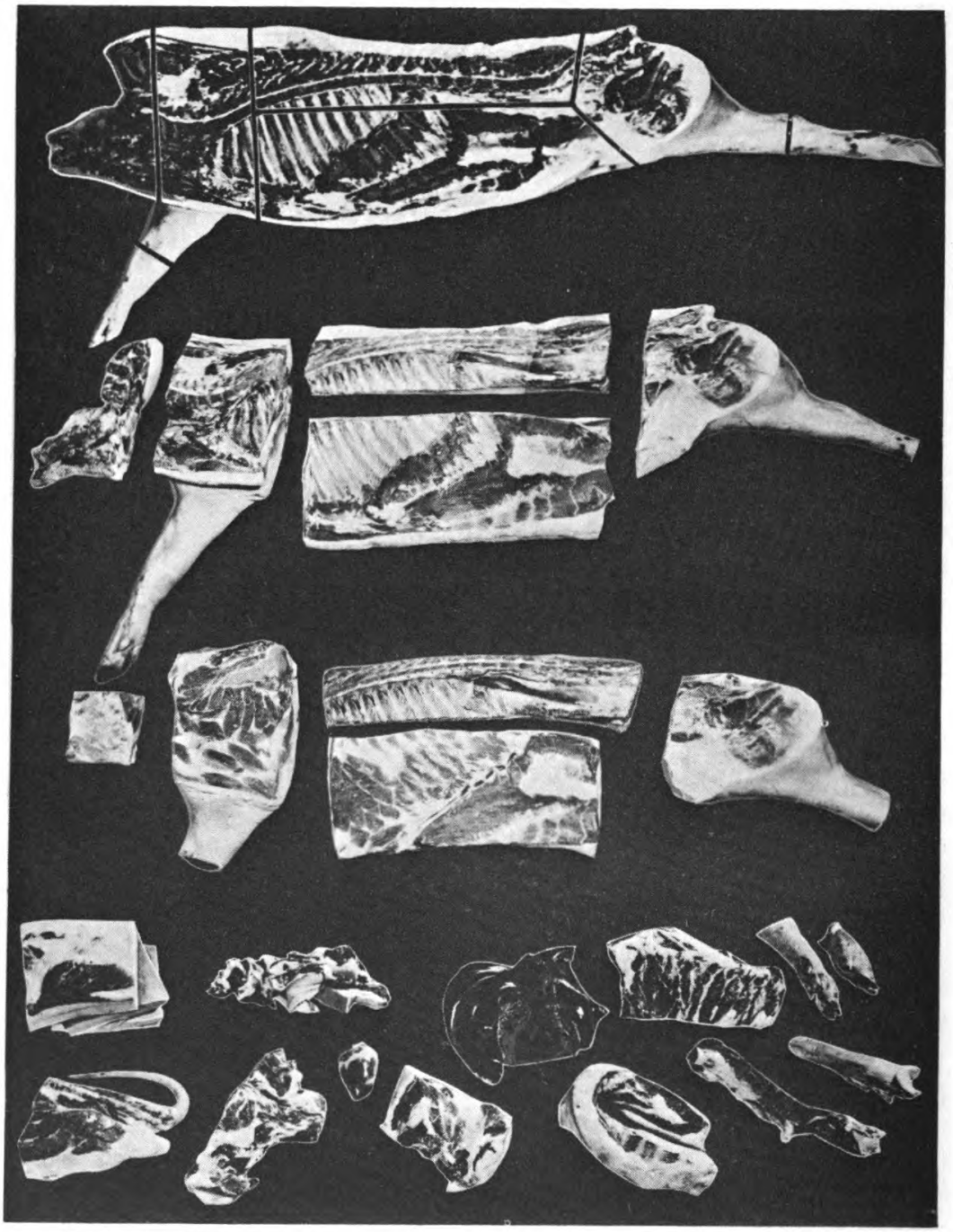


FIG. 96. The different cuts of pork. Guide lines (in the side of pork at the top) show where cuts should be made. Underneath are the principal cuts before they are trimmed—jowl, shoulder, loin, bacon, ham; next are the trimmed cuts; and last the trimmings.

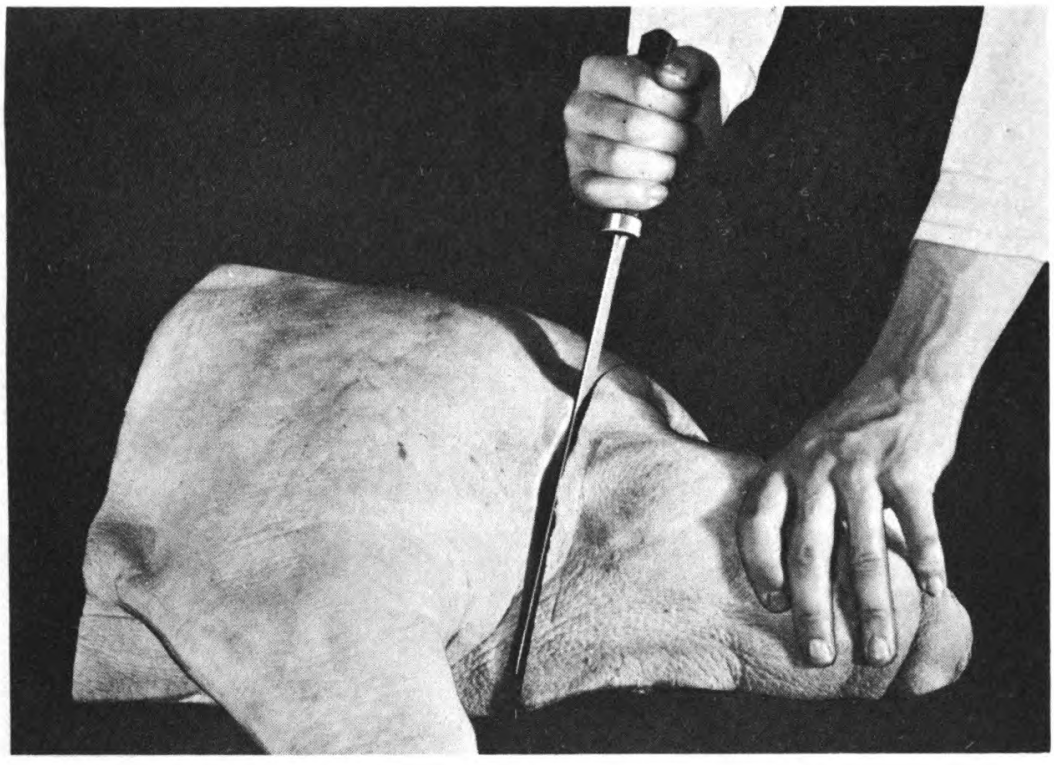


FIG. 97. If the head has not been removed previously, cut it off at a point where the backbone ends.

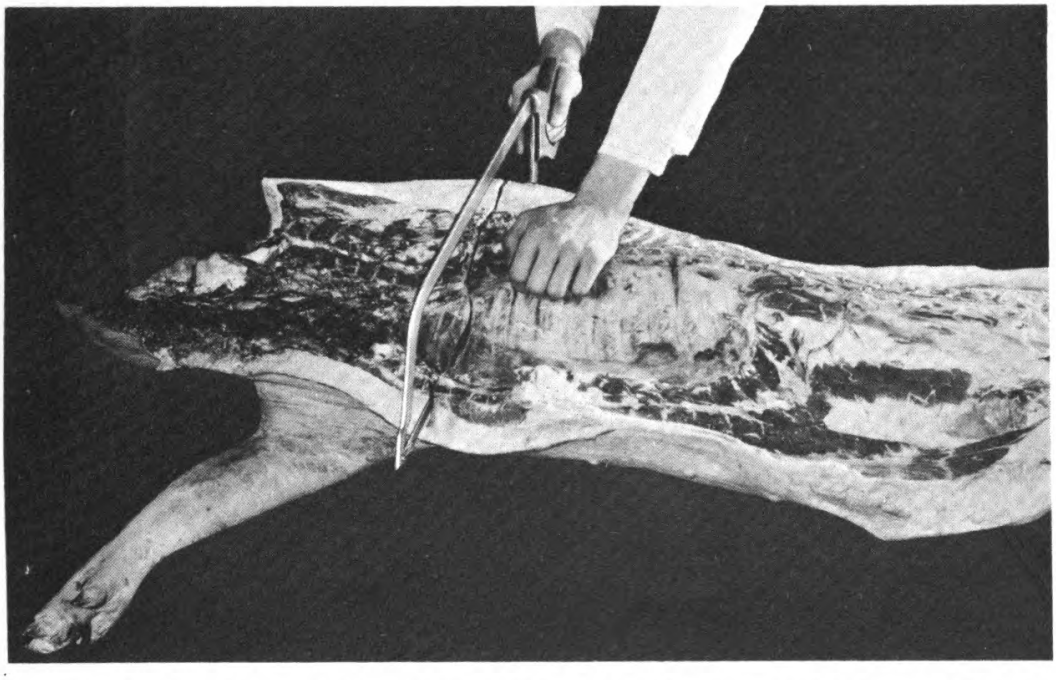


FIG. 98. Start cutting up the carcass at the shoulder, through the third and fourth ribs.

at right angles to the back. Use the knife to complete the cut. If the head has not been removed previously, then cut off the jowl at a point where the backbone ends, which is in line with the wrinkle of the neck.

Trim some of the cheek meat from the jowl and flatten it out with the broad side of a cleaver or hatchet and square it up by trimming with a knife. The trimmed jowl is known as a "bacon square" and can be cured and used the same as bacon, or used for seasoning with boiled foods.

Remove the neck bone from the shoulder, leaving very little meat on the bone. Trim the shoulder and cut off the shank. This is the "long-cut" method of trimming and will give the maximum of cured meat from the shoulder. Saw the shank off above the knee joint.

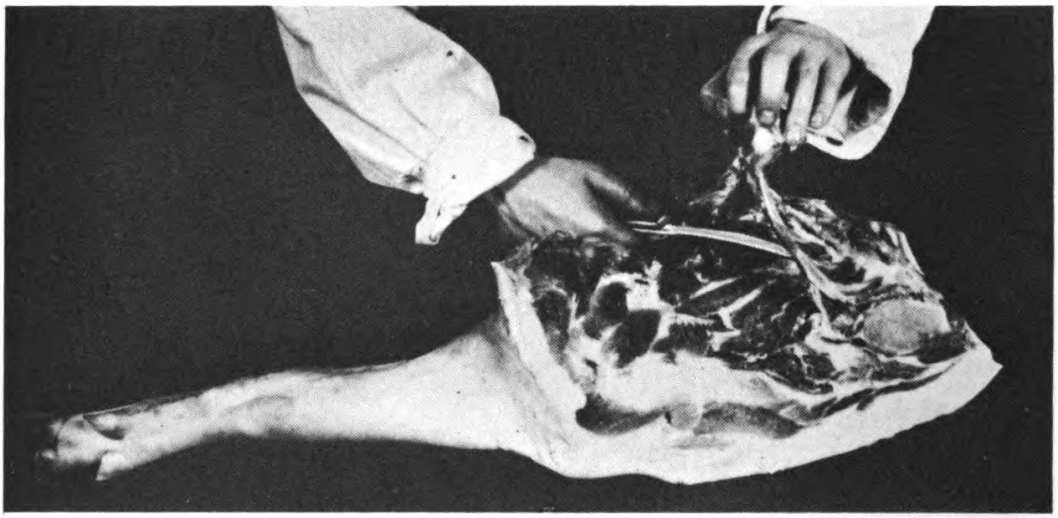


FIG. 99. Remove the neckbone from the shoulder, leaving very little meat on the bone. Trim up the shoulder and cut off the shank.

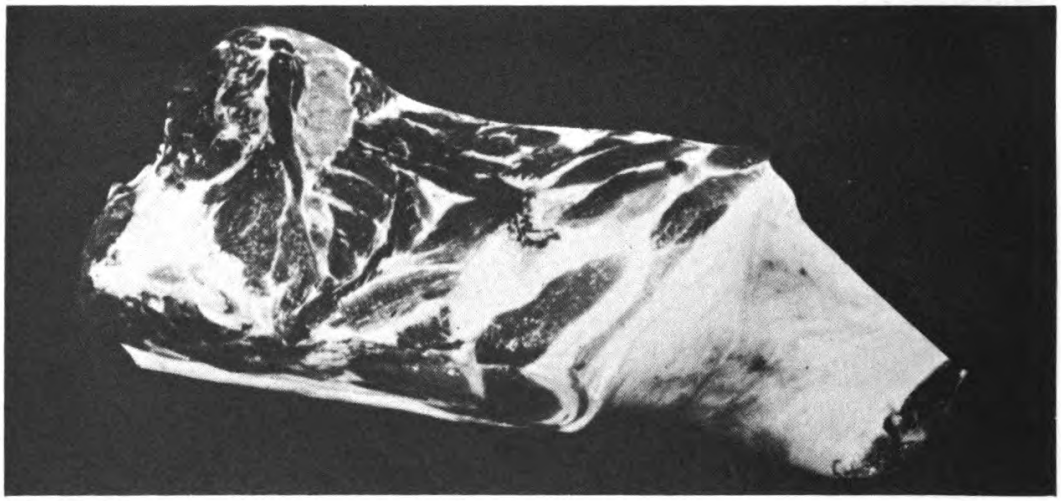


FIG. 100. This is the long-cut method of trimming and gives the maximum of cured meat from the shoulder. Shank is sawed off above knee joint.

If smaller cured cuts are desired, the shoulder can be divided between the smallest part of the blade bone, producing a picnic shoulder and butt. The picnic shoulder will cure quicker than the long-cut method and makes a convenient, handy-size shoulder for small families. When the shoulder is separated into picnic and butt, the clear plate, which is the covering of fat on the top of the shoulder butt, is skinned off. The fat may be cured for seasoning or used for lard. The lean portion is known as the "Boston" butt and can be cured or used for sausage. When neatly trimmed, the picnic shoulder has the appearance of a small ham.

To take off the ham, saw on a line at right angles to the hind shank and at a point about three finger widths in front of the aitchbone. Finish the cut with the knife and begin shaping the ham by curving the cut on the belly side.

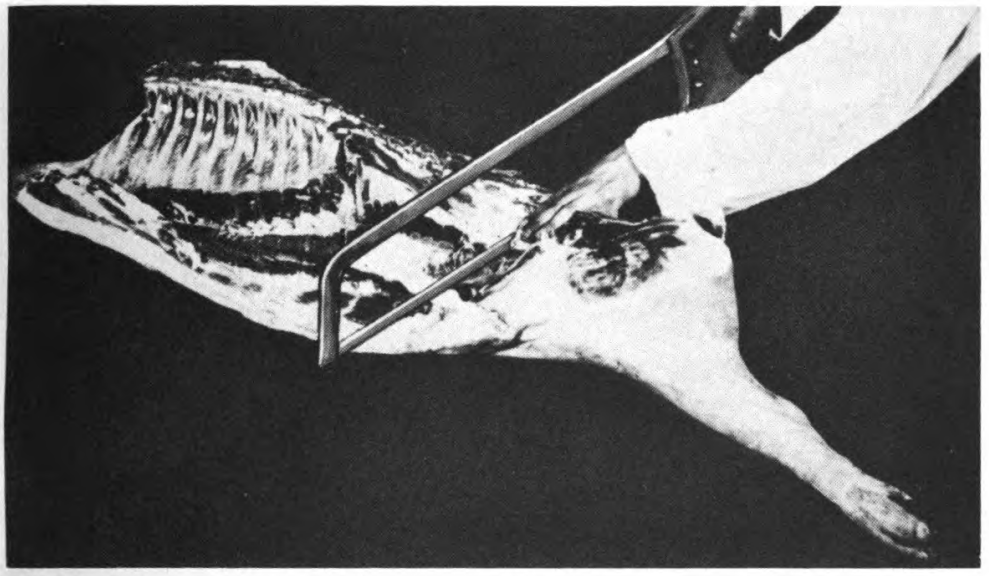


FIG. 101. To take off the ham, saw on a line at right angles to the hind shank and at a point about three finger-widths in front of the aitchbone.

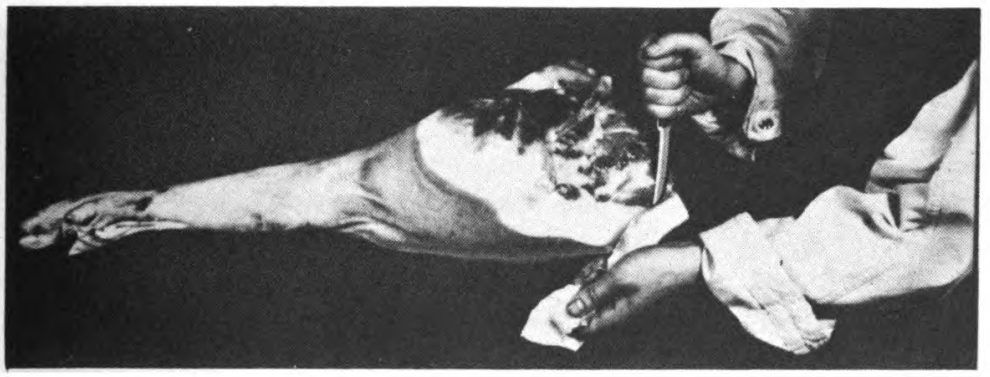


FIG. 102. Smooth up the ham by trimming off all the loose pieces of meat. Hams that are neatly trimmed cure better and are easier to wrap.

To remove the tail bone slip the knife under the tail bone and continue the cut along the bone, keeping the knife as flat as possible. If the hams were faced when the carcass was hung up to chill, each ham then will require comparatively little trimming. When the tail bone is removed the hams should be trimmed smooth of all loose pieces of meat which can be used for sausage. If the corners and loose pieces are left on the hams they will dry up in the cure, having little food value, and the hams will be less attractive. Hams that are neatly trimmed and rounded cure better and are easier to wrap.

If hams are exceptionally fat, and if too much fat is objectionable, the hams can be skinned. This is done by leaving a collar of skin around one-third of the ham at the shank end. The balance of the fat is trimmed off, leaving about one-fourth inch of fat over the lean. Skinned hams do not keep as well as hams that are not skinned, and for that reason skinning is not recommended as a general practice. After hams are trimmed, saw off the shanks just below the button of the hock.

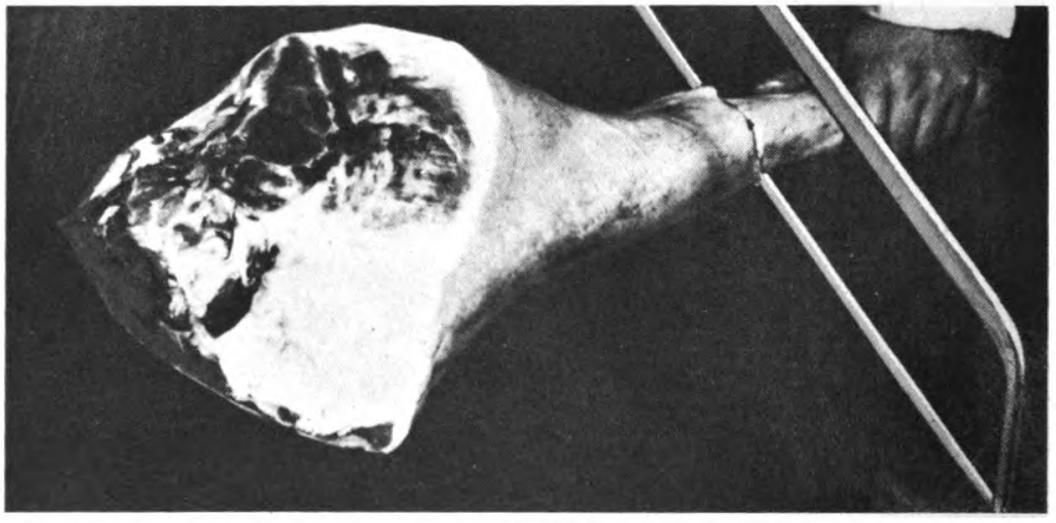


FIG. 103. After the ham is trimmed, saw off the shank just below the bottom of the hock.

To separate the loin from the belly, the ribs are sawed across at their greatest curvature. This is about one-third the distance from the top of the backbone to the bottom part of the belly edge. Make this cut so as to include the tenderloin with the loin. After the ribs are sawed through, finish the cut with the knife, completely separating the belly side from the loin. Lay the belly on the table, skin side up, and smooth out the wrinkles as well as possible with the palm of the hand. A few sharp blows from the side of the cleaver or hatchet will help loosen the spare ribs from the belly.

Now turn the belly, skin side down, and trim out the ribs. Start this cut by loosening the neck bone at the top of the ribs. Keep the knife as flat as possible to avoid gouging the bacon. Pull the ribs upward as the cut is made and trim as close to the ribs as possible.

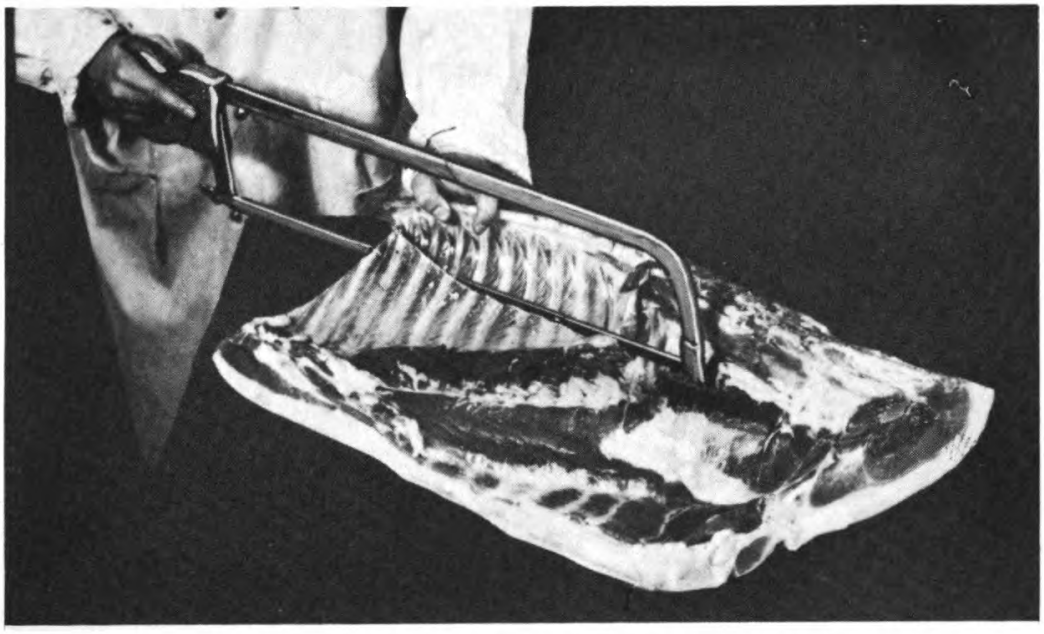


FIG. 104. Separate the loin from the belly by sawing across their greatest curvature.

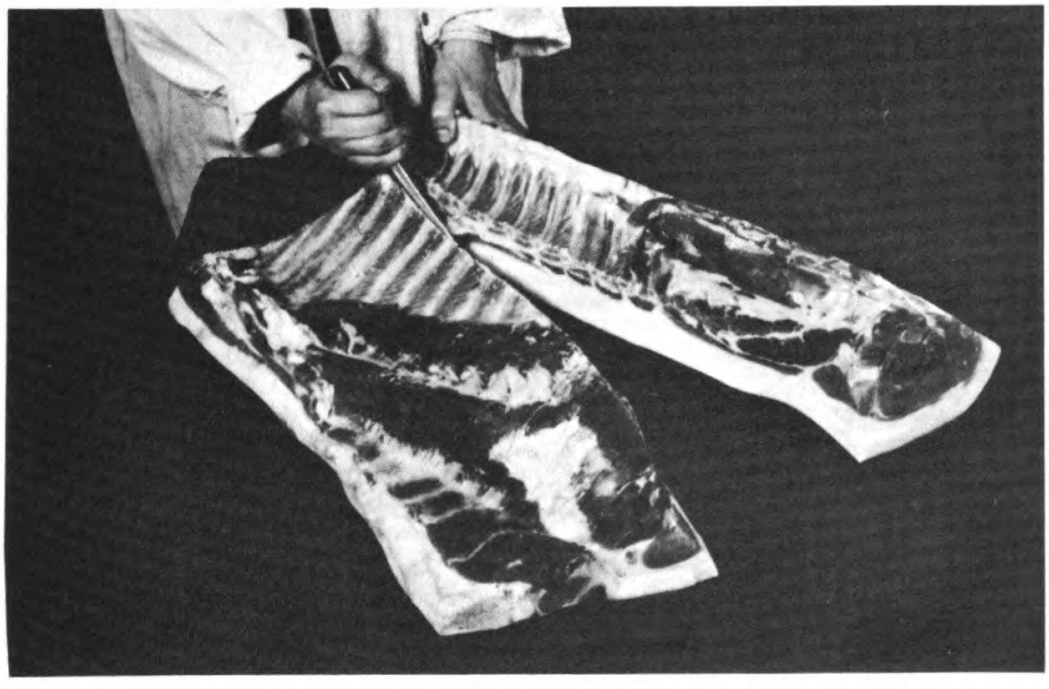


FIG. 105. After the ribs are sawed through, finish the cut with the knife.

The cartilaginous ends or "buttons" of the lower ribs are left on the bacon.

Square the bacon by trimming the lower edge first to a straight line. All of the "seeds," the mammary glands along the lower edge, should be trimmed out of choice bacon. Next trim the top on a line parallel to the lower edge until a good streak of lean appears and then square both ends enough to reach an attractive lean streak. Frequently there is an uneven space at the front end of the bacon,

FIG. 106. Start cutting out the ribs with the neckbone at the top of the ribs, and keep the knife as flat as possible.

FIG. 107. Square up the bacon by trimming all four sides.

which is known as the bacon brisket. This may be cured or used for sausage or lard.

The tenderloin is the small lean muscle which lies underneath the backbone in the rear of the loin. It is one of the most popular of all pork cuts to be used fresh. It is generally prepared by cutting across into pieces about 1 inch thick, and "frenching." This is done by placing the pieces of tenderloin (on end) on a strip of parchment or waxed paper and folding the paper over the top of the meat. The meat is then struck a sharp blow with the flat side of the cleaver, flattening it out. The paper keeps the meat from sticking to the table or the cleaver. These delightful morsels cannot be equaled for tenderness by any other pork cut.

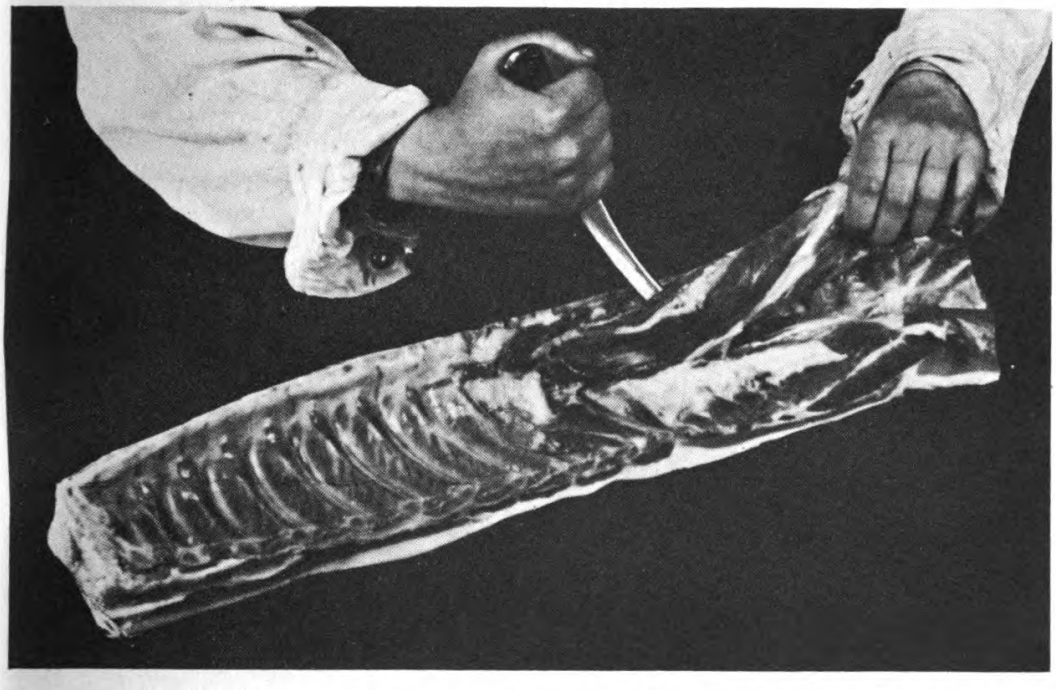


FIG. 108. Trim out the small lean muscle (tenderloin) which lies underneath the backbone in the rear of the loin.

After taking out the tenderloin, remove the fat back from the loin. Place the loin skin side down, set the knife about one-fourth inch under the lean or muscle meat, and make a full length cut. Reverse the loin and make the same cut from the other side. This separates the fat back from the loin. The fat back may be used for lard or may be cured and used for seasoning when cooking. The remaining fat on the loin should be smoothed off up to about one-fourth inch in thickness. The loin is one of the choicest cuts of pork and it is made possible by splitting the carcass down the

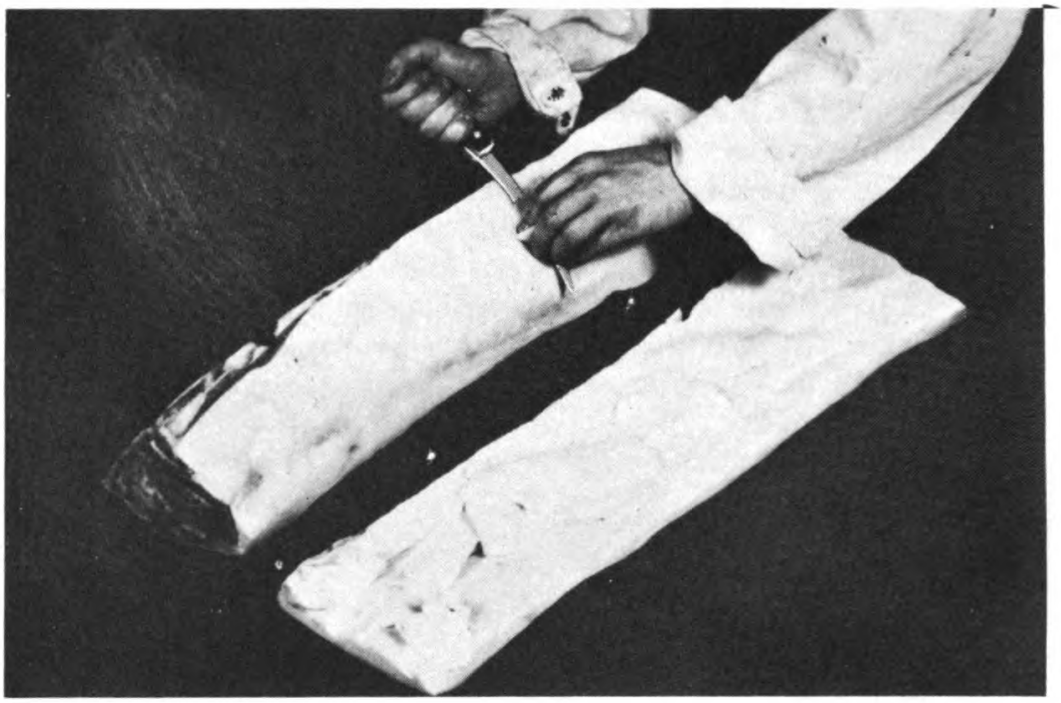


FIG. 109. Separate the fat back from the loin and smooth up the remaining fat to about ¼ inch in thickness.

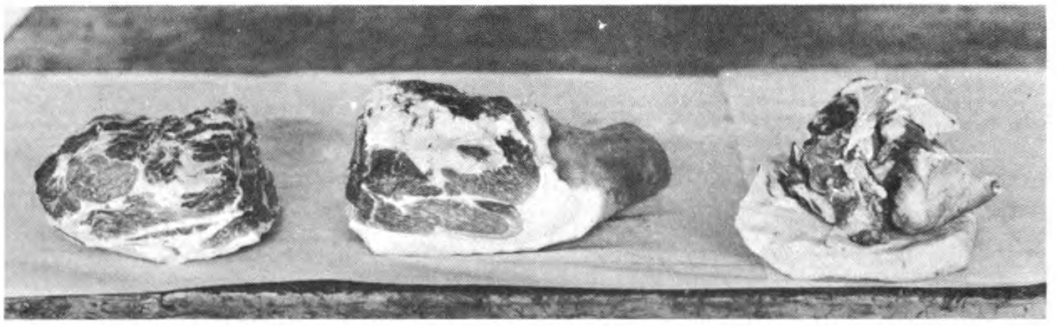


FIG. 110. Well-trimmed pieces of pork (*left to right*): shoulder butt, picnic ham, and trimmings piled on plate.

middle of the back instead of cutting along each side of the backbone. One of the most practical ways to use the loin is to cure it as Canadian style bacon.

After trimming the loin cut up the other one-half of the carcass, starting with the shoulder and finishing with the loin.

All pieces for curing should be trimmed smoothly and uniformly. Remove all blood spots (almost always found in the shoulder) and ragged pieces of meat and fat. A good job of trimming reduces waste. The meat will get a uniform cure and have a better flavor and a more appetizing appearance.

FIG. 111. Skinning fat trimmings. Keep the knife parallel with the table and the edge turned slightly downward toward the skin.

BEEF AND VEAL

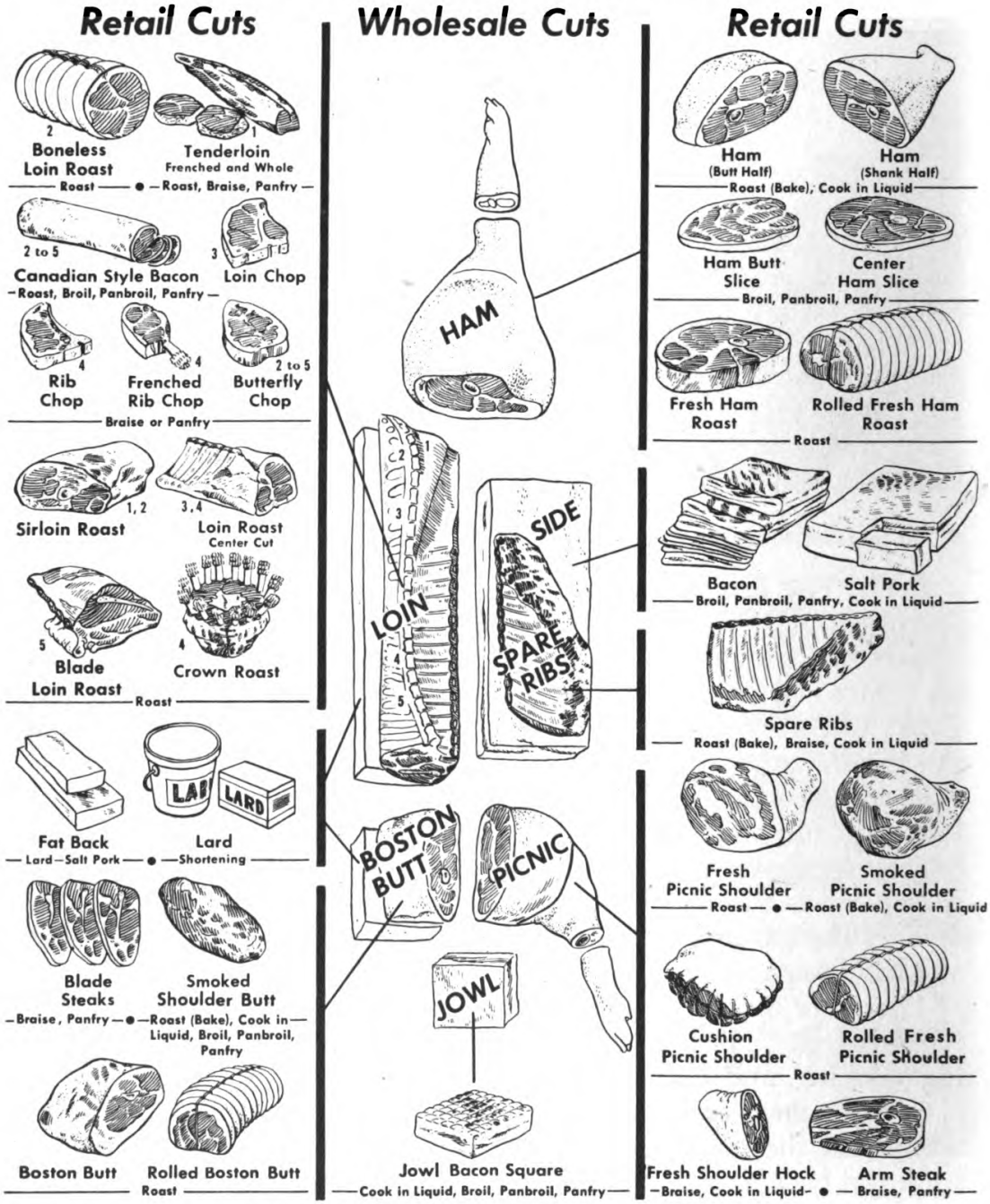
Beef. The first step in cutting the beef carcass is quartering or "ribbing down." This divides the fore and hindquarters. Each side of beef has thirteen ribs. Insert the knife blade between the twelfth and thirteenth ribs at a point midway between the backbone and flank. Cut the backbone on a parallel with the ribs, then cut toward the flank leaving 6 to 8 inches of flank to hold up the forequarter when the backbone has been sawed. Saw the backbone in two on a line with the knife cut between the ribs. This will leave the forequarter hanging from the uncut strip at the flank. Now, while one person holds the forequarter to keep it from falling, another one finishes the cut at the flank, completing the separation of the fore and hindquarters.

There are different methods of cutting up the beef carcass. The following one, however, is intended to give pieces suitable for curing, cooking, and canning.

Cutting the Forequarter. Place the forequarter on the cutting table with the outside up. Along the twelfth rib about 10 inches from the backbone is the point to begin making the first cut. The idea is to separate the plate from the rib. Start at this point and make a straight line cut across the shank just above the elbow joint. Cut through the meat to the ribs. Saw along the same line and remove the plate and brisket. A saw rather than an ax or cleaver should be used for cutting bones. This will avoid splintering

Meat Cuts and How to Cook Them

PORK CHART



NATIONAL LIVE STOCK AND MEAT BOARD

FIG. 112.

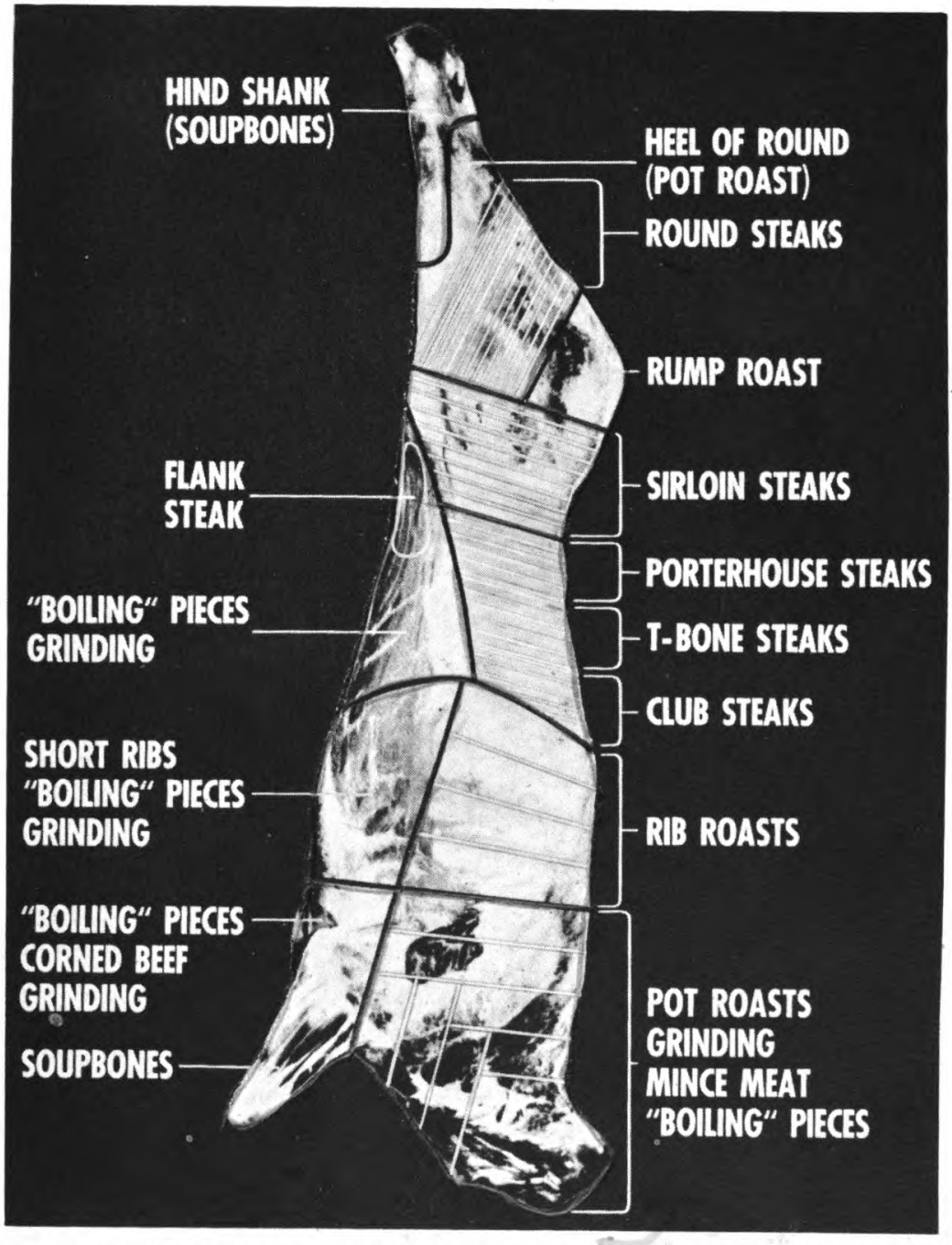


FIG. 113. Black lines show wholesale cuts, and white lines show retail cuts.

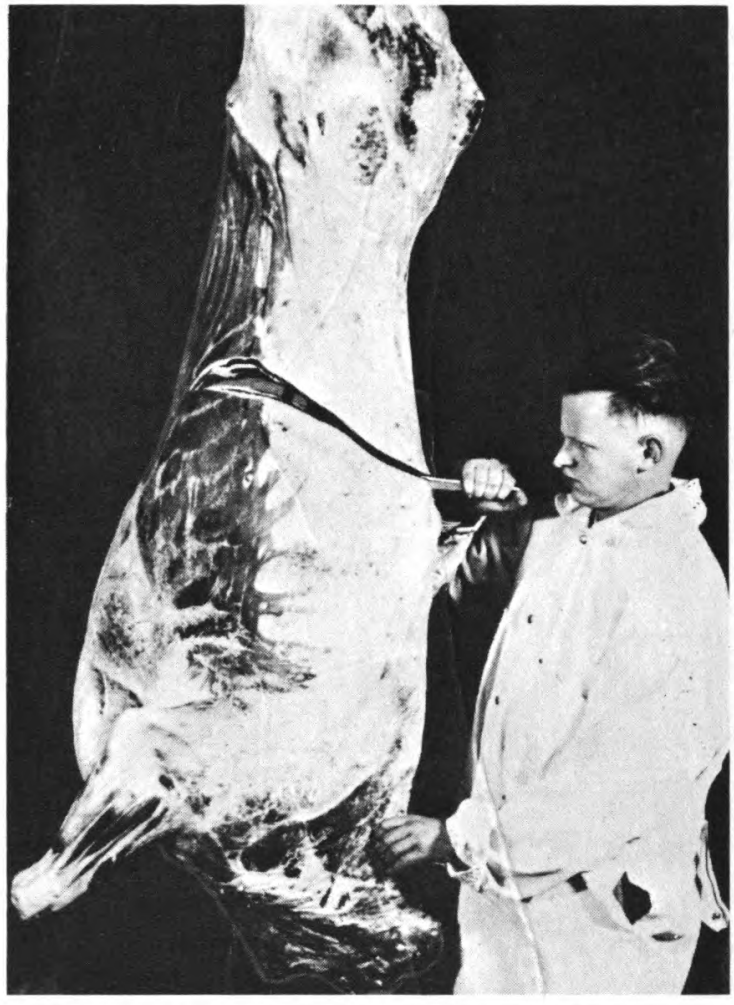


FIG. 114. Dividing the forequarter and the hindquarter. The cut is made between the last two ribs.

the bone and causing unnecessary waste of meat. Now, saw the foreshank off at the elbow. Cut between the fifth and sixth ribs to separate the rib cut from the chuck. Complete the cut with the saw, passing through the backbone. There are seven ribs in the set of ribs which may be further divided into two or three rib roasts. Roasts are made by cutting between the ribs. These roasts may be boned and rolled if desired. The chuck is somewhat less tender and better adapted for pot roasts, corning, or grinding. It can also be cut into roasts if desired. A two-rib roast called a chuck roast can be cut. A round-bone pot roast can be removed by cutting across the shank bone. Additional chuck roasts are then cut parallel with the ribs. The remainder, the neck and shoulder, may be cut into suitable size pieces for stewing or boned out for hamburger or mince meat.

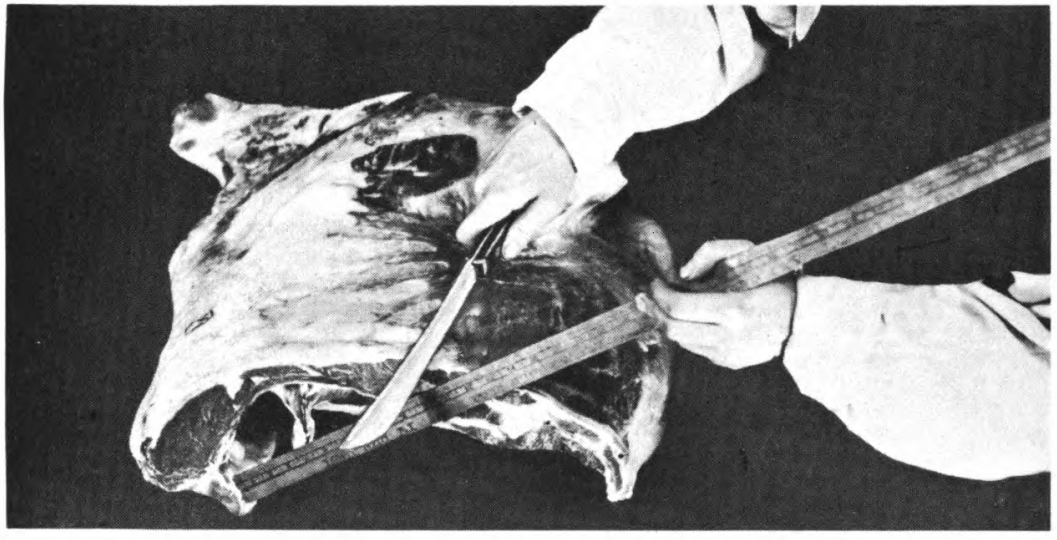


FIG. 115. Separating the plate from the rib. Start cutting 10 inches from the backbone along the 12th rib.

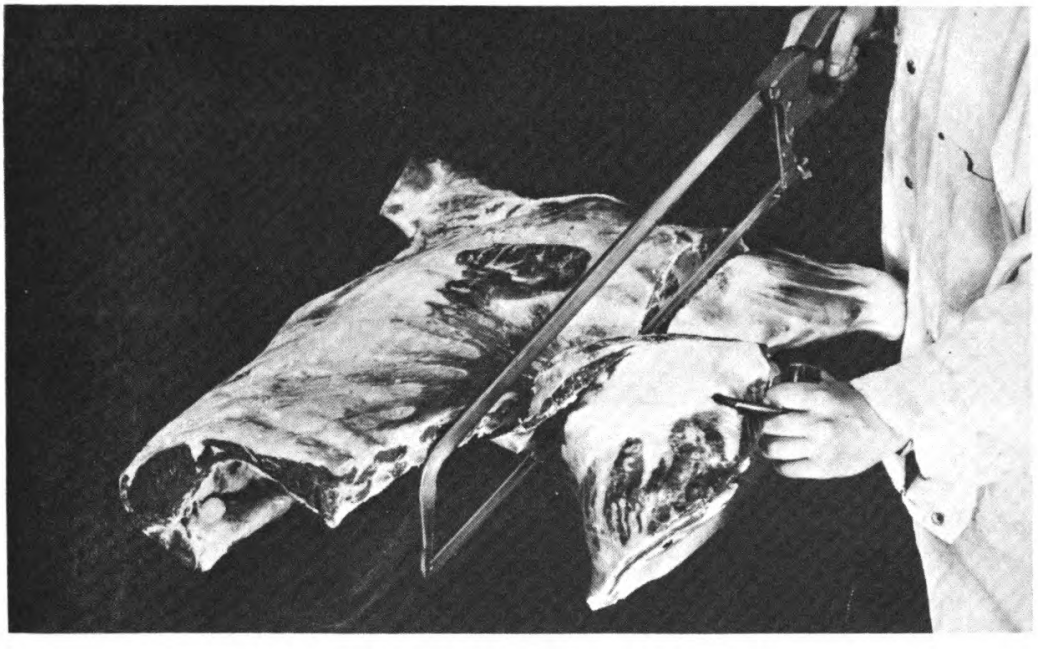


FIG. 116. Sawing off plate and foreshank.

Cutting the Hindquarter. Lay the hindquarter on the table with the inside or the carcass up. Remove the flank from the hindquarter along the natural division by cutting alongside a continued line of the inside of the hind shank across the last rib. This contains the flank steak which can be pulled out. The balance of the flank can be used for boiling or ground for hamburger, meat loaf, or mince meat.

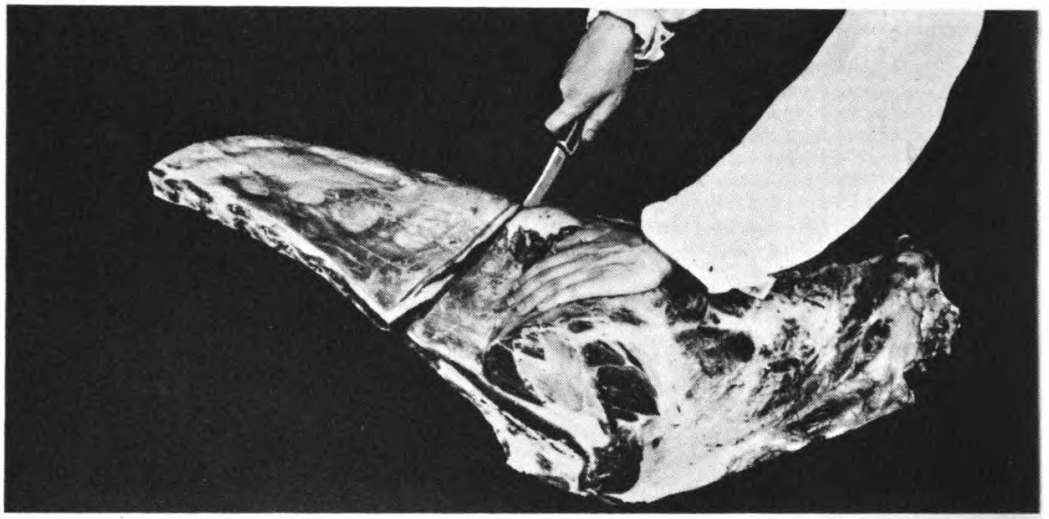


FIG. 117. Separating rib and chuck. Cut between the fifth and sixth ribs.

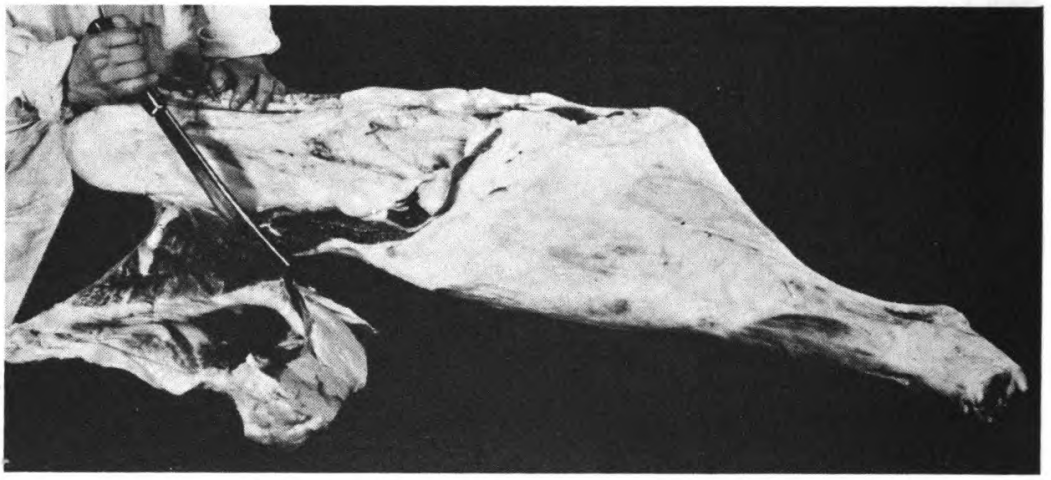


FIG. 118. Removing flank from hindquarter.

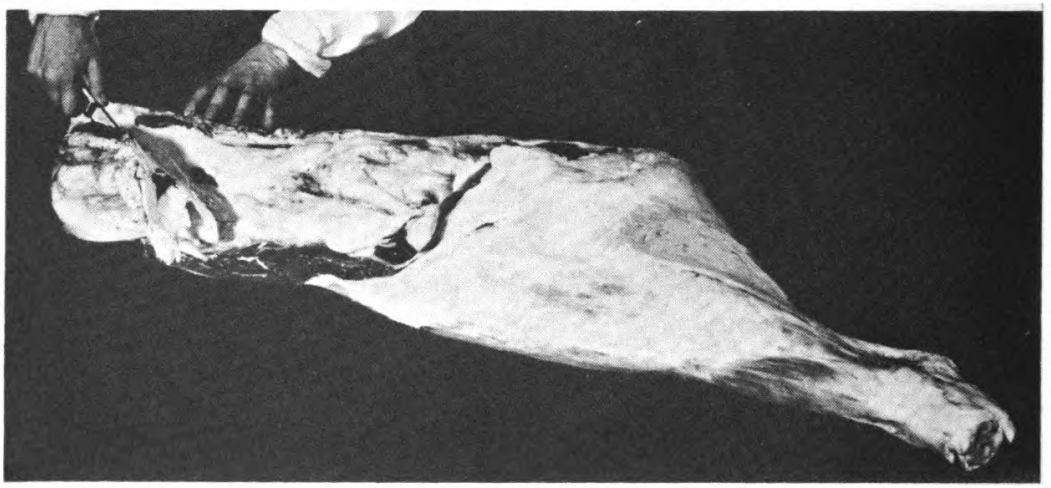


FIG. 119. Trimming out the kidney.

Now trim out the kidney and the fat in which it is imbedded, but leave enough fat on the backbone to cover the tenderloin.

Separate the loin from the round and rump at the ball-and-socket hip joint. Cut directly below and parallel to the pelvic arch. Start this cut with a knife; complete it with the saw. The loin may be divided into the sirloin and porterhouse at the hip joint. Steaks from the short loin are good eating. Separate the rump from the round by sawing across the floor of the aitchbone. The rump makes a desirable roast or choice corned beef. The pelvic bone may be trimmed out of the rump. The shank may be cut off at the upper end of the long bone.

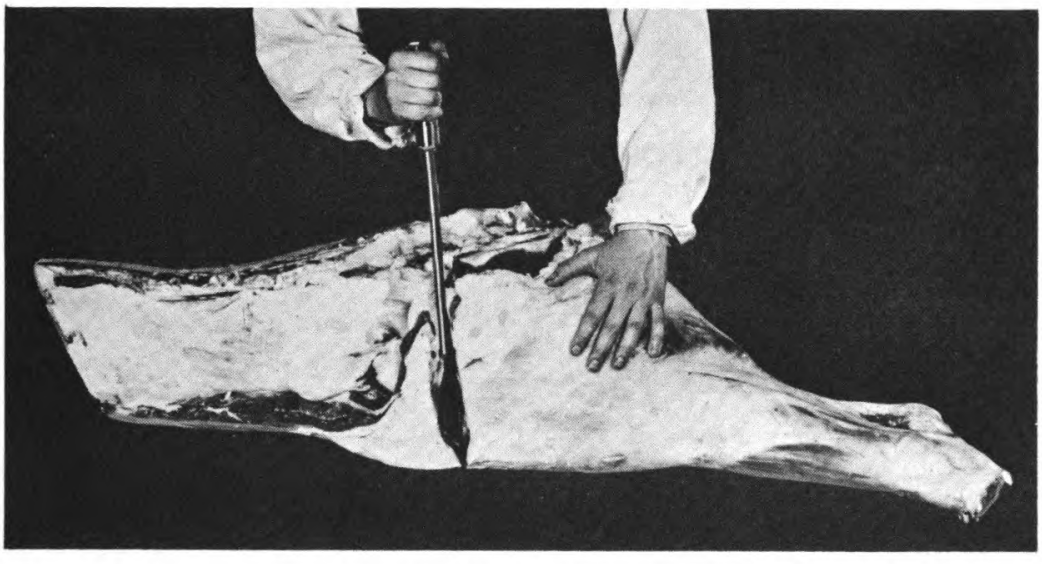


FIG. 120. Separate the loin from the round at the ball-and-socket hip joint.

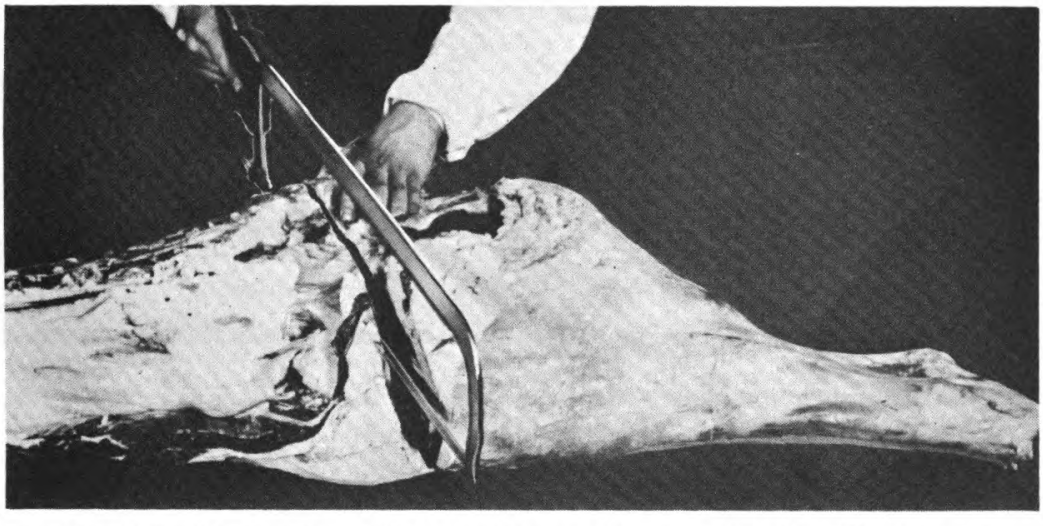


FIG. 121. After starting the cut with a knife, complete it with the saw.

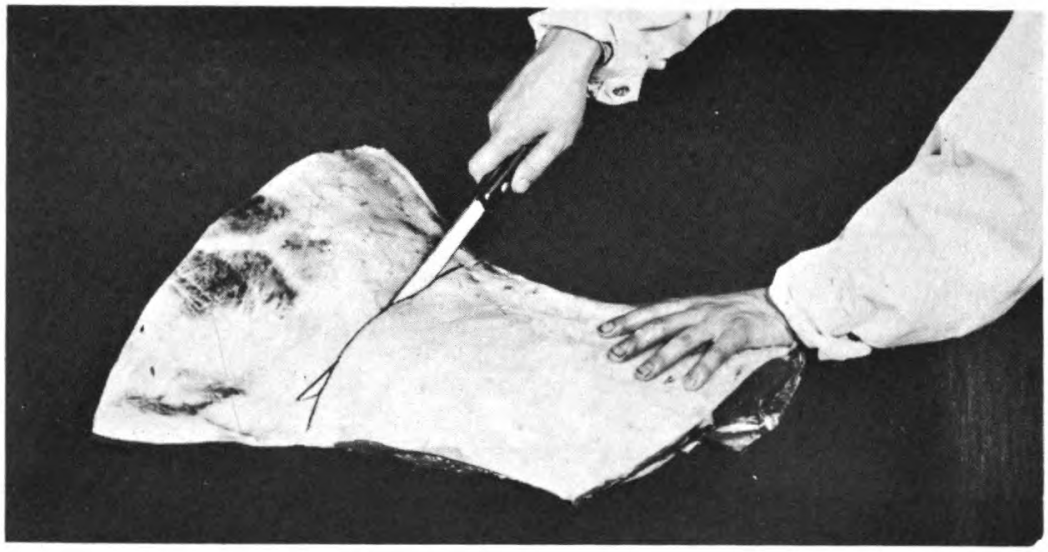


FIG. 122. Dividing the loin into short loin and loin end.

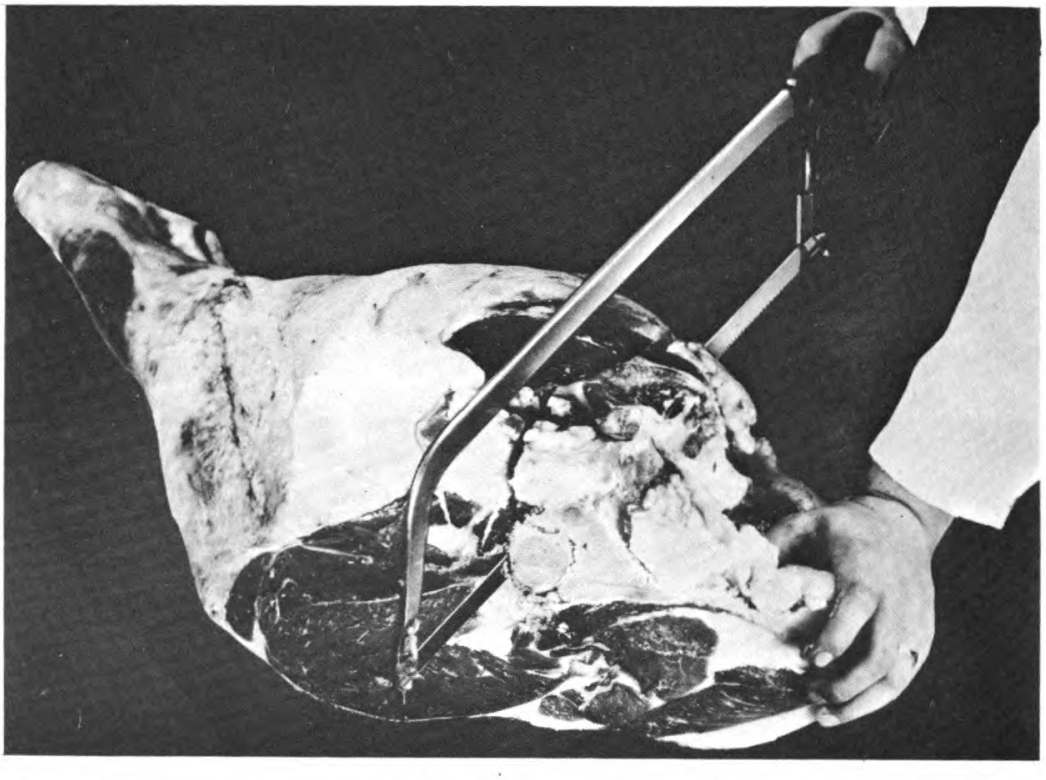
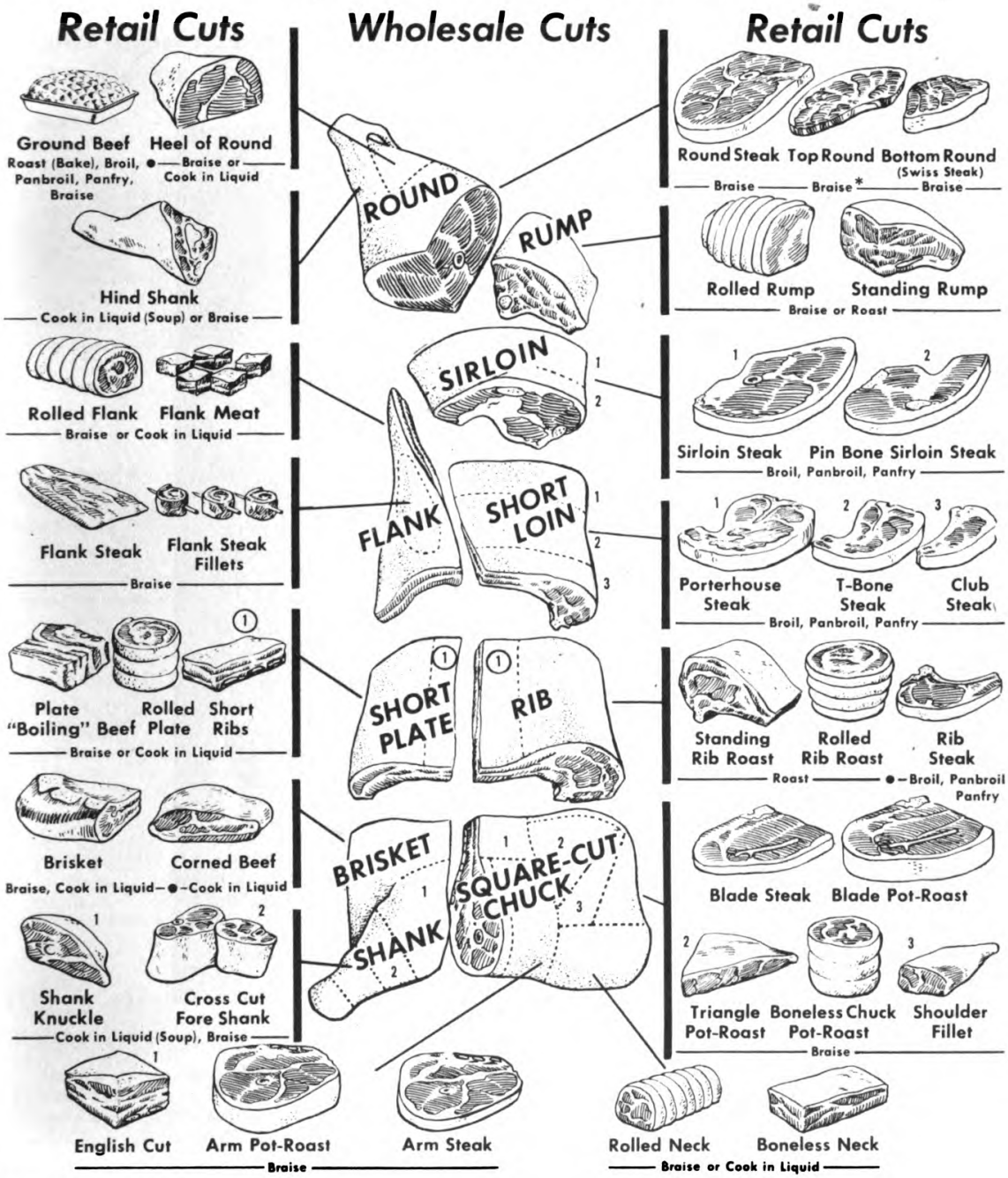


FIG. 123. The rump is removed from the round by sawing across the floor of the aitchbone.

Meat Cuts and How to Cook Them

BEEF CHART



*Prime and choice grades may be broiled, panbroiled or panfried

FIG. 124.

Veal. Veal is very tender and is mostly lean meat. It contains very little fat. Veal also contains a high percentage of moisture, and for that reason most of the carcass should be utilized as fresh meat. The heavier cuts can be cured and canned advantageously.

After the carcass has been chilled thoroughly, cutting can begin. The same general pattern followed in cutting a beef carcass can also apply to veal. The sweetbreads, brains, and liver are choice

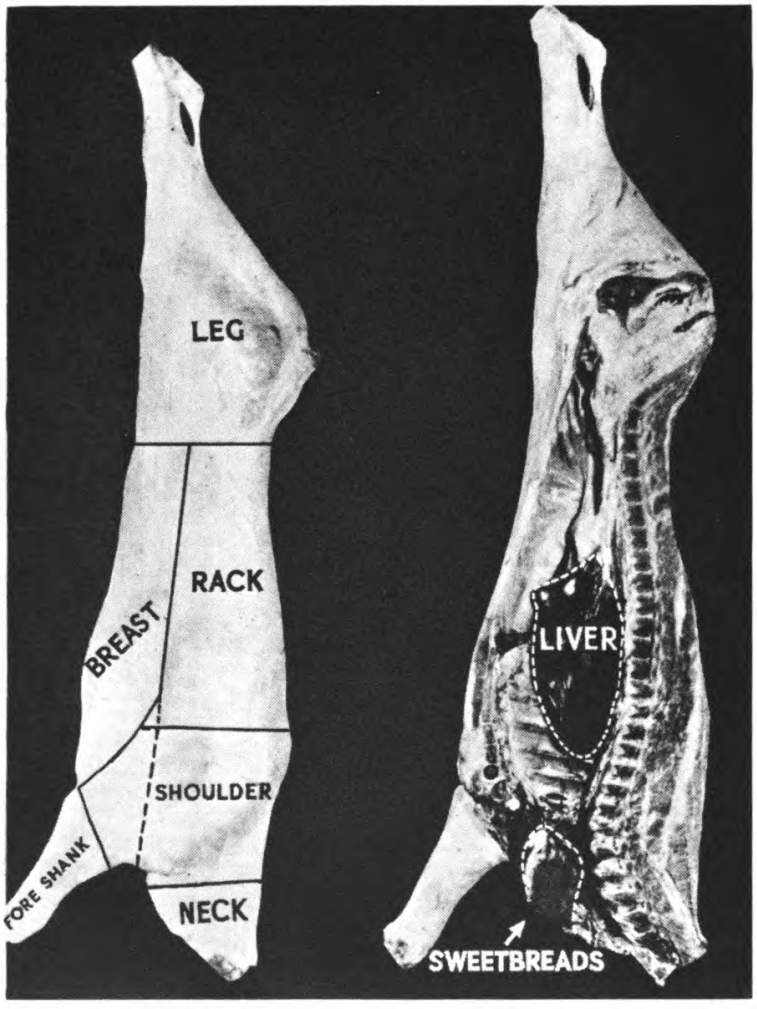


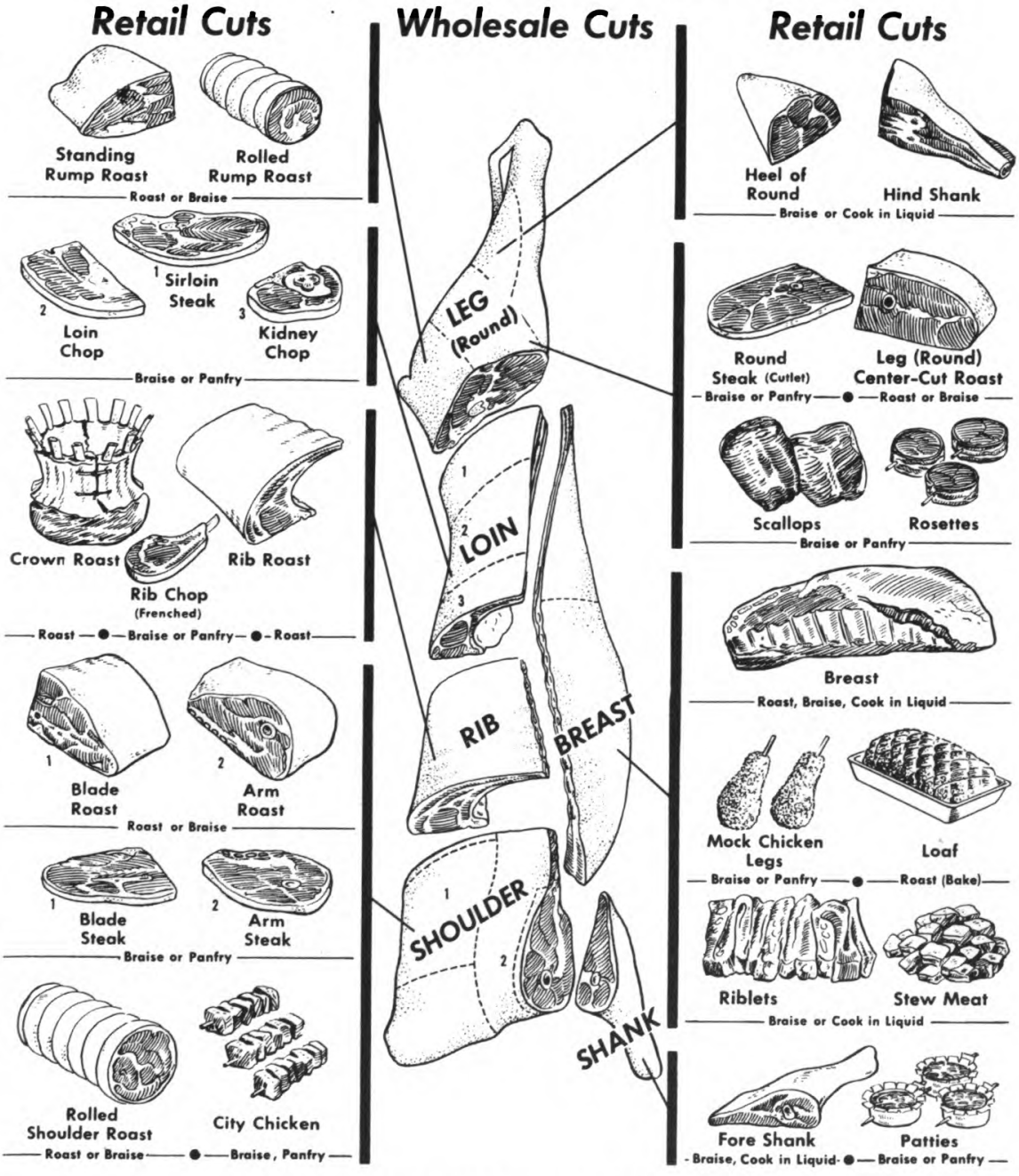
FIG. 125. Guide lines for making veal cuts. The sweetbreads, brains and liver are choice parts that are used first.

parts. They should be removed and used first. The neck and shank can be cut into chunks and used for stews and soups. The trimmings can be ground for veal loaf.

Split the carcass with a saw in the same manner as that prescribed for beef. Now the veal carcass is ready for cutting. Separate the

Meat Cuts and How to Cook Them

VEAL CHART



NATIONAL LIVE STOCK AND MEAT BOARD

FIG. 126.

fore from the hindquarter. Remove the foreleg by cutting just above the elbow bone. Separate the front shank from the shoulder and back. The shoulder may be cut into chops or steaks, as they are sometimes called, or it may be boned and used for a roast. After the bone is removed, the meat is rolled lengthwise and tied tightly with cord crosswise around the roll about an inch apart.

Work on the hindquarter begins by cutting the sirloin roast from the leg of veal. After that, remove the rump from the leg. Round steaks or cutlets are cut from the leg of veal.

Lamb and Mutton

Ordinarily the lamb carcass is not split down the center of the backbone, but it may be. The beginner, however, will find it easier to divide the carcass into the most desirable pieces for using fresh or for curing. There are many different ways of cutting the lamb carcass. The cuts made depend a great deal on the uses to be made of the meat, whether most of it is to be used fresh, canned, or cured. The larger cuts, like the legs and shoulders, are the best cuts for curing. Corned lamb is easy to process, and the breast and shank are best suited for this purpose. A good way to use the small pieces and trimmings is to grind the meat and make lamb patties or mix it with pork in making sausage.

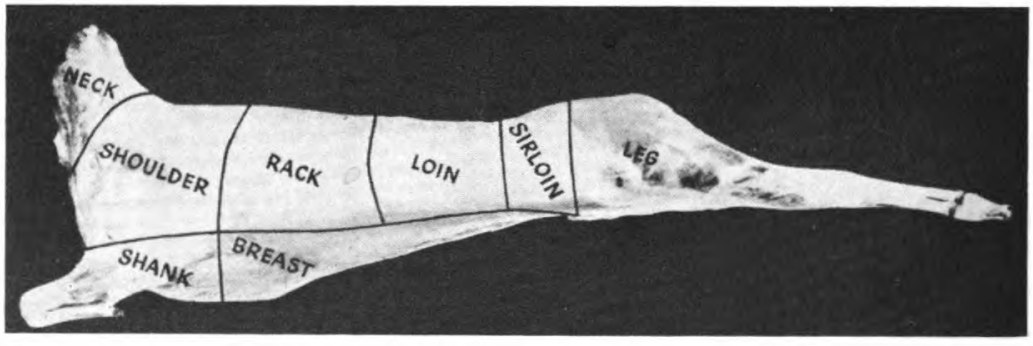


Fig. 127. Black guide lines show where to make the cuts to separate the lamb carcass into the most desirable pieces for using fresh or for curing.

The lamb carcass, like beef, has thirteen pairs of ribs. Begin by sawing off the shoulder between the fifth and sixth ribs; or, if a narrow shoulder is preferred, saw between the third and fourth ribs. Then cut the neck off on a line flush with the shoulder. Saw off the shank. Separate the shoulders by sawing through the backbone. Turn the carcass on its side, with the legs toward you and saw off the breast piece. Then separate the rack from the loin by cutting between the last two ribs to the backbone. Start the cut with a knife

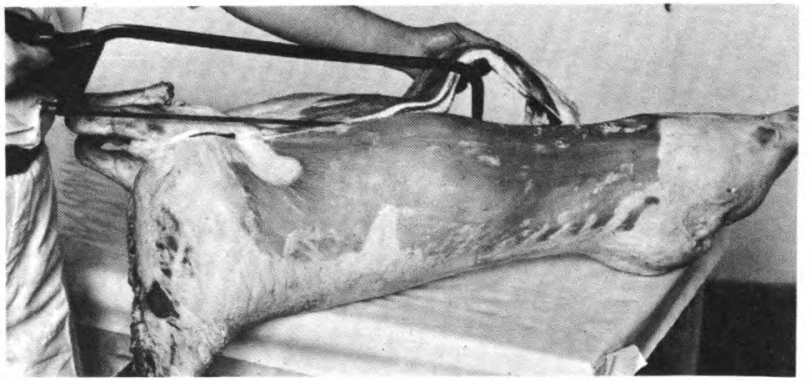


FIG. 128. The first step in cutting a lamb carcass: removing the breast. This carcass has been cut for long chops. A deeper cut along the same line will produce a larger portion of breast and shorter chops.

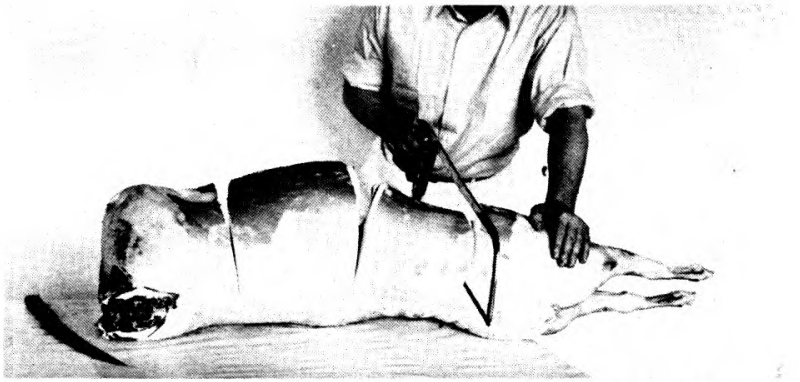


FIG. 129. After the breast and neck are removed, a 5-rib shoulder, a regular rib cut, a loin and a long-cut leg are made.

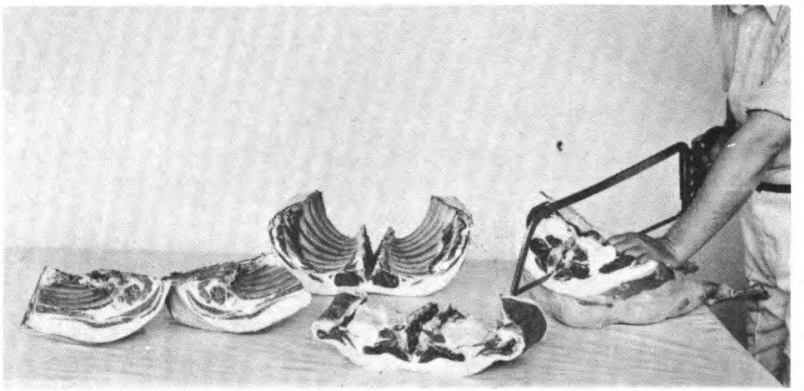


FIG. 130. Splitting the cuts down the center of the backbone. The cuts shown are (*left to right*): shoulders, ribs, loins, and legs.

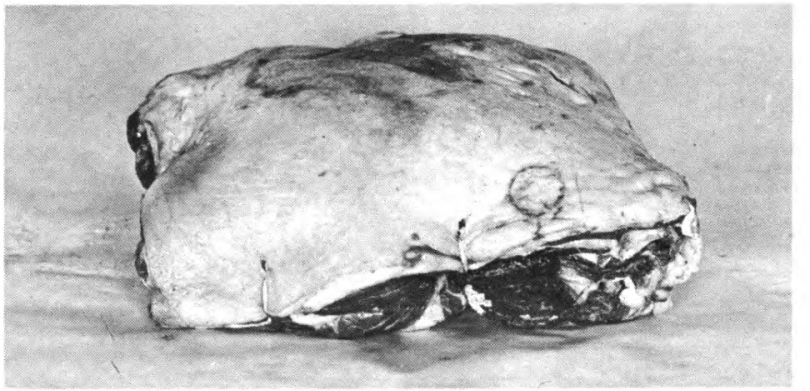


FIG. 131. Cushion style, boneless shoulder roast.

and complete with a saw through the backbone. Rib chops may be cut from the rack after splitting, or the piece can be used for making a crown roast. Cut and saw the loin from the long legs through the small of the back or just forward of the hip bones. Now the sirloin is cut from the loin in the same manner. The thickness is optional. The sirloin makes an excellent size roast, or it can be cut into chops. The legs are then separated by splitting down the center of the backbone with the saw.

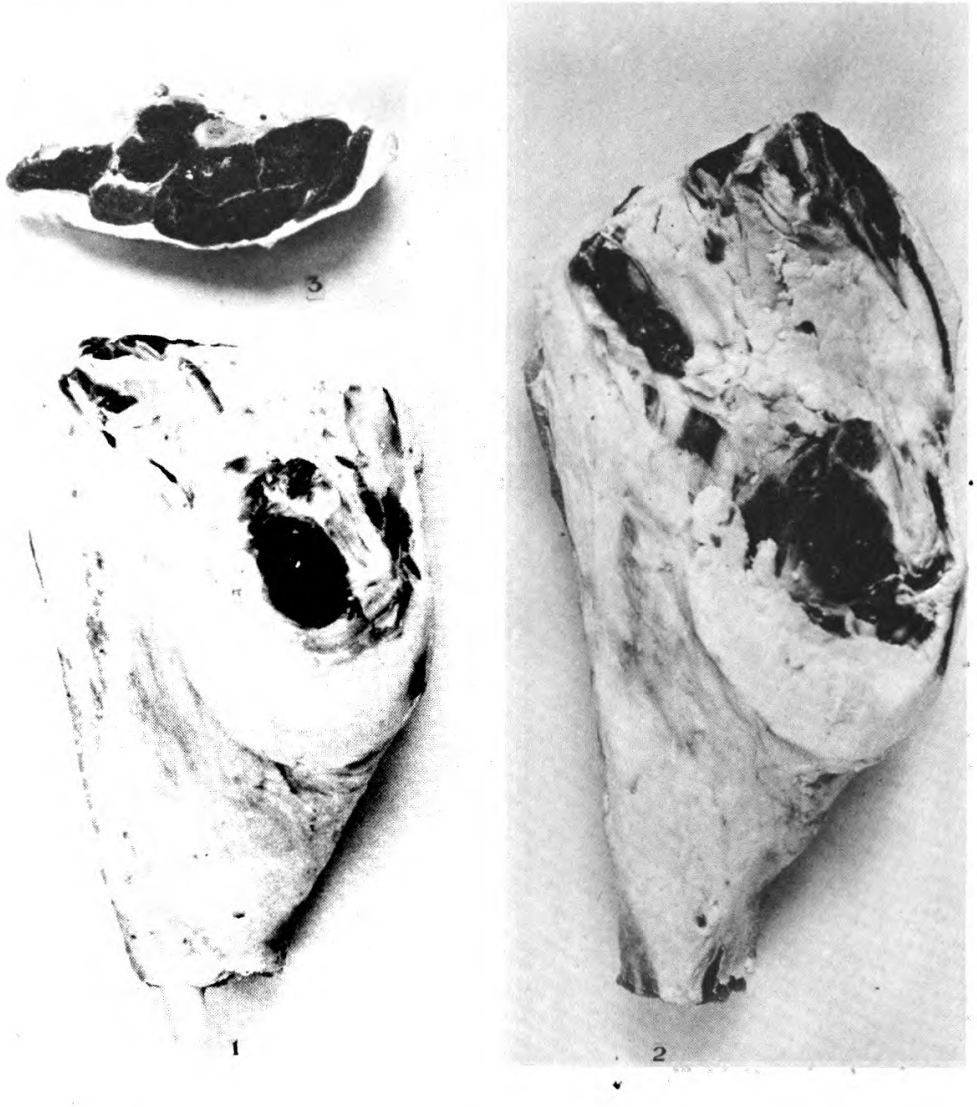


FIG. 132. Two methods of trimming a leg of lamb for roasting: (*1*) French method, with chops removed (shown at *3*); (*2*) long-cut leg.

Meat Cuts and How to Cook Them

LAMB CHART

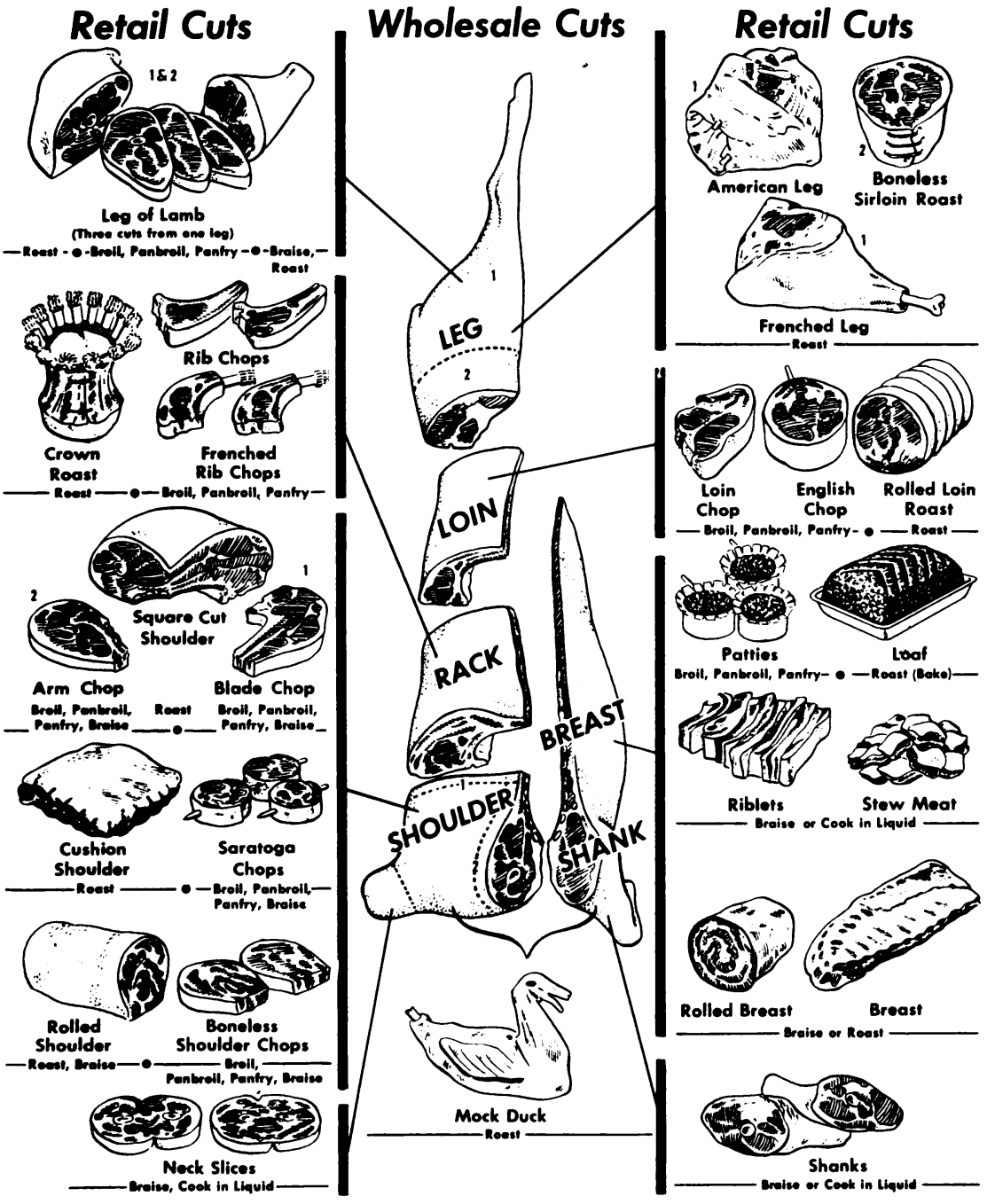


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FIG. 133.

Venison

Venison [1] from the deer or elk has always been a staple article of diet, a favorite with hunters and epicures. It is covered with white, scented fat, which connoisseurs greatly appreciate.

Venison is an excellent substitute for beef and mutton, which meats it resembles in texture, color, and general characteristics. Its flavor is distinctive, suggestive of beef rather than mutton.

Venison becomes more tender and palatable when allowed to ripen or age for a short time. When conditions permit, it may be allowed to hang from two to three weeks before being cut up.

The first step in cutting a venison carcass is to split it with a saw down through the back and neck. From this point on the procedure is the same as that described for a beef or veal carcass. It is not necessary to make all these cuts in cutting up venison because it is not nearly as long nor as well-fleshed in all its parts as an average steer. However, if you wish to take time and trouble to make such cuts, you will be rewarded by a more efficient utilization of the meat and attain better results in cooking. Stew and soup meat come from the neck and shanks; the round and rump furnish roasts, round steaks, and soup bones. From the flank and plate come ribs and good stew meat, and the chuck yields roasts.

How to cut up venison without wasting any of it is best described in an article, "Venison—(As You Like It)," which appeared in the December 1941 issue of *Gourmet Magazine.*

A deer, though it is not a very large animal, may seem large, indeed, when one is confronted with the eating of it. There seems so much meat all at once, and surely some must be wasted. Yet of waste there need be but little. I mind the white-tail I once prepared in this manner:

The neck I boned, and trimmed the meat into a square. The trimmings went through the food chopper, and were mixed, half and half, with fresh fat pork, then seasoned with salt and pepper, nutmeg, and a little sage. This ground venison made an excellent breakfast sausage and a meat loaf. The bones went into chasseur soups, consomme, and venison stock. And the square of neck meat was used for stews, salmis, and ragouts.

The front legs, too, were boned, and then tied, and steeped for four or five days in a marinade made of 1 part red sour wine to 2 parts water, and seasoned with garlic, celery, onions, bay leaves, carrots, cloves, caraway seeds, whole black pepper, salt and a little sugar. After the marinating,

[1] The term "venison" comes from the Latin term *venatus* which means "to hunt." The latter probably is akin to the Sandskrit term *venati,* which means "he desires, attacks, gains." Originally, the word venison applied to the flesh of any beast or bird of the chase, but has now come to apply only to flesh of deer and deer kind.

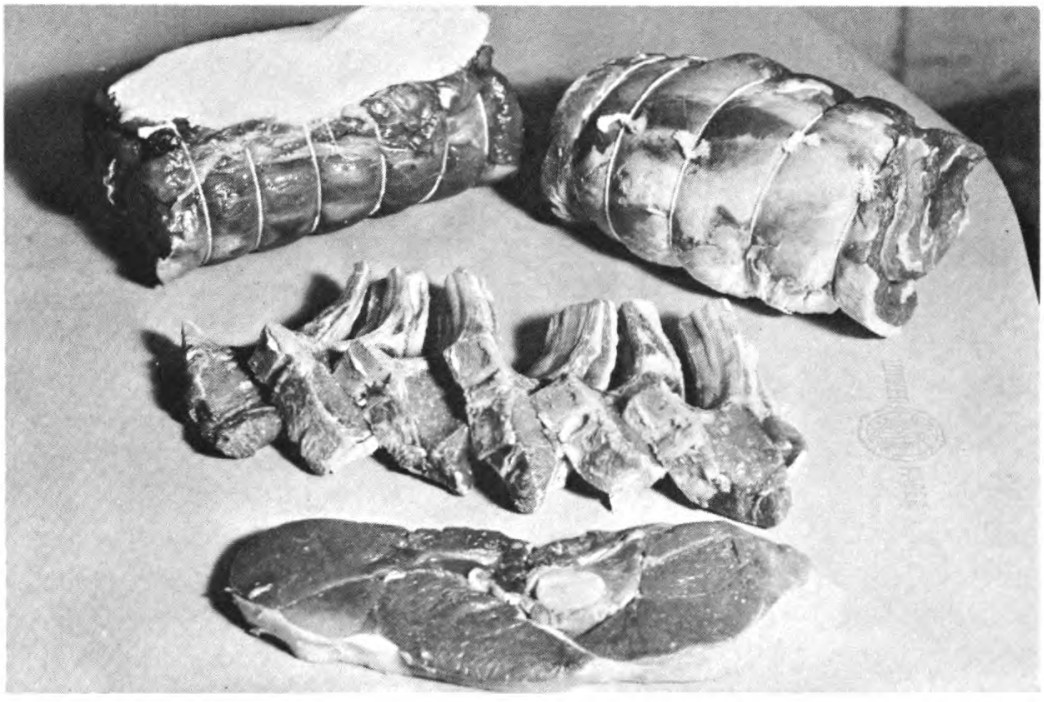


FIG. 134. Some cuts of venison: *upper left*—a roll-top shoulder with a slice of fresh pork fat for self-basting; *upper right*—a rolled shoulder of a fat doe; *center*—rib chops from a fat doe (they show some marbling); *lower*—a venison round steak.

I roasted the meat in a hot oven till it was just done, and used the marinade as a basting liquor for the roast and a foundation for the gravy.

The ribs, of course, became chops. Cut between each bone, the chops were seasoned with salt, pepper, and butter, and were broiled over an open fire until they were done to a medium turn. And just before they were taken from the fire, they were seasoned again with salt and freshly ground black pepper.

The hindlegs were treated as though they were lamb. With a clove of garlic the meat was rubbed well, and into the pan with the meat went another clove of garlic, along with 2½ cups of tomatoes—a No. 2 can—and a sprig of celery-top tied together with a few sprigs of parsley and a large bay leaf, and pepper and salt, of course. When the meat had been cooked, the surplus fat went into the gravy, made from browned flour and stock from venison bones. The gravy, cooked till the flour taste was gone, was strained through a cheese cloth, and enriched with half a cup of currant jelly, the juice of an orange and half a lemon, and a bit of the shredded rind of both.

The short ribs were cut, some one, some two ribs to the piece, and were placed in a covered roasting pan with canned tomatoes, and seasoned with whole black peppers and smoked salt. The ribs were then baked until they were almost done. When the meat began to appear dry during the baking, it was basted with venison stock, not water. For the final cooking,

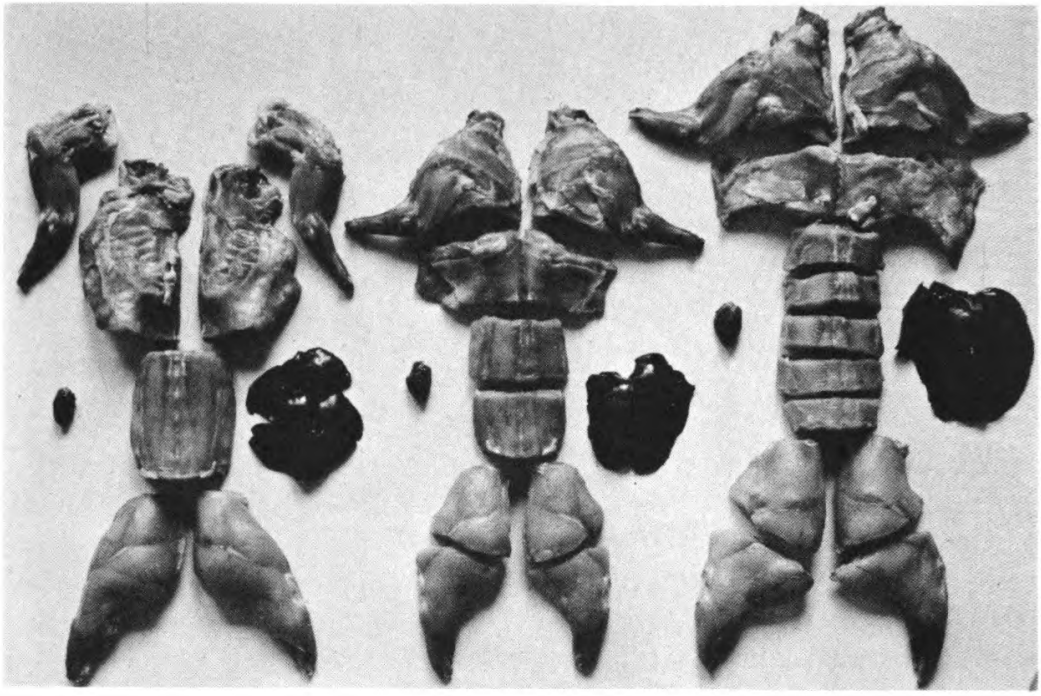


FIG. 135. Rabbit carcasses cut up for the pan. The heart is to the left and the liver to the right of each carcass. *Left to right*: carcass of small fryer rabbit cut into seven pieces; carcass cut with bandsaw into uniform pieces; a larger carcass cut into portions for individual serving.

the ribs were placed in an open pan, and returned to the oven for crisping. The drippings from the ribs became a gravy through the addition of a thin paste made of flour and butter. This gravy was allowed to boil up a few times to eliminate the flour taste, and was then strained through a cheese cloth.

The flanks wound up in a ragout. The meat was cut into 1-inch pieces, and dredged with flour, then fried until it was a rich brown. In a heavy pot some butter was heated to a nut brown color, and some finely diced onions and garlic were added to brown. With these the already browned meat was placed, and covered with venison stock. Twenty minutes before the meat was ready, fresh mushrooms and green peppers, both cut in half-inch dice, were dropped in the ragout, along with a bouquet garni, salt, pepper, and enough good red wine barely to cover.

For these dishes no other accompaniment is needed but a prefatory cup of consomme, a side dish of a fine chestnut puree, a climaxing light dessert, and a red Burgundy of good year and good name. There are those, of course, who prefer Champagne, and those, again, whose tastes run to whiskey and rum.

Of course, all these dishes were not made at once. A deer carcass will probably last for some time, so it should be properly stored so that pieces may be sliced off when they are needed.

XI

DRESSING POULTRY AND WILD FOWL

There are numerous ways of killing, plucking, and drawing poultry and wild fowl, but it is important to have an attractive carcass when the work is completed. The appearance and condition of dressed birds depend greatly on the care used in applying these dressing processes and in cooling the carcass.

Domestic birds ready for killing should be deprived of feed for 24 hours. This will clean out the feed from the crops and intestines. The dressed birds also will keep longer and will be of better quality. During the period they are not fed they should have water, which will wash feed particles out of the digestive tract. This "starving before killing" is very important.

Methods of Killing Poultry

Poultry may be killed by beheading, dislocating the neck, or sticking. Cutting off the head is the common home-and-farm method. Dislocating the neck is rarely practiced. Sticking involves severing the arteries in the bird's neck and is most commonly used commercially.

Removing Feathers

The feathers of poultry and game birds can be removed by dry plucking, scalding, semi-scalding, and wax plucking.

Dry picking is difficult and requires considerable practice and skill, but it makes an attractive carcass either when used fresh or frozen. In dry plucking, rapidity of movement is necessary.

Scalding is accomplished by immersing the bird for a few seconds in hot water (150° to 190°F.). If the water is too hot or the bird is kept in it too long the skin may appear as if cooked. Young birds

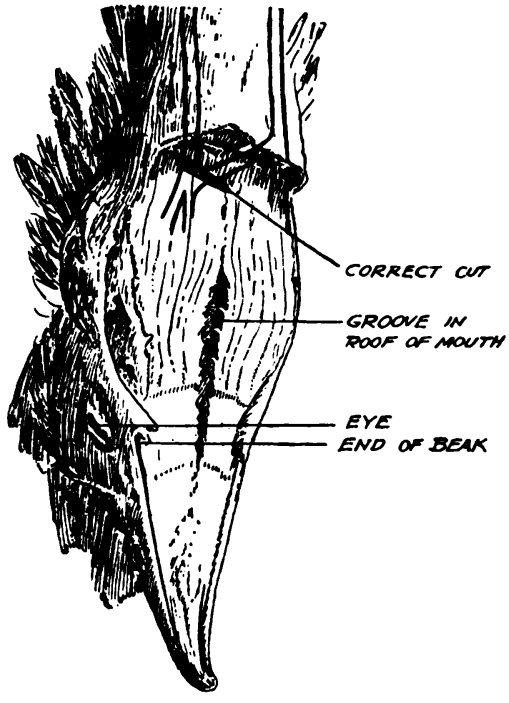


FIG. 136. Cutting the bird's throat from the outside. Cut the large vein and the cross vein at the same time to insure good bleeding.

AVERAGE PERCENTAGES

(Based on Empty-body Weight of Parts of Carcasses of 45 White Plymouth Rock and 70 White Leghorn Cockerels at Increasing Weights and Stages of Growth and Fattening)

Breed of chickens and parts of carcass	Data for birds of approximate slaughter weight of—								
	0.5 lb. %	1 lb. %	1.5 lb. %	2 lb. %	3 lb. %	4 lb. %	5 lb. %	6 lb. %	7 lb. %
White Plymouth Rock:									
Skin	6.5	7.8	7.7	7.3	7.0	7.4	8.1	7.6	8.5
Neck	3.7	3.5	3.3	3.9	3.7	3.7	3.4	3.4	3.4
Legs above hock	16.2	18.0	19.0	20.2	21.5	22.1	22.1	22.2	24.9
Wings	6.5	6.4	6.3	6.4	6.7	6.6	5.9	5.9	5.7
Torso	21.3	22.5	22.4	22.0	23.4	24.6	25.0	26.4	26.9
White Leghorn:									
Skin	7.08	6.52	6.47	6.43	6.82	7.16	6.65	.....	.....
Neck	3.59	3.61	3.24	3.21	3.34	3.10	2.85	.....	.....
Legs above hock	15.60	17.30	18.80	19.70	21.20	20.90	21.60	.....	.....
Wings	6.65	6.93	6.98	7.03	7.29	6.74	6.41	.....	.....
Torso	20.50	23.30	24.00	25.10	25.40	26.60	26.70	.....	.....

SOURCE: AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE.

scald best in temperatures 150° to 160°; and older and tough ones require temperatures of 180° to 190°. Scalding and plucking the feathers is a good method if the birds are to be consumed a short time after dressing. They do not keep well in storage or present an attractive appearance.

Semi-scalding is the method used by large commercial poultry killing plants. It is not practical for dressing birds at home and is not generally used by farmers. Therefore it is not necessary to describe the method in detail.

Wax plucking involves dipping the birds into melted wax. The birds are first roughly dry-plucked—that is, the main tail feathers are removed, the wings picked clean, and most of the body feathers are removed. The chickens are then dipped 3 times into a special kind of melted wax heated to a temperature of 125° to 130°F. After 20 minutes the waxed bird is dipped into or sprayed with cold water to stiffen the wax. The wax is then removed in pieces, taking with it the remaining hair and feathers. Paraffin will serve the same purpose as the wax.

Upland game birds, shore birds, and waterfowl should never be scalded for plucking but should be dry-picked. The feathers should be pulled downward in the direction that they grow—never upward as this tears the skin.

The best time to pluck a game bird is shortly after it is killed when the feathers droop. It is important that it be done rapidly so as to complete the work before the feathers set.

With ducks and geese, owing to the thickness of the feathers, dry picking is a slower process than with other fowl.

Chickens. One of the best ways to kill a chicken is to bleed it by severing the arteries in the neck. The fowl is suspended by the feet at about the height of the shoulder of the plucker. Any stout cord with a short stick at the end will do to wrap around the bird's feet. In that position it is ready to be bled.

A particular kind of killing knife is desirable. The blade should be a heavy piece of steel, about 2 inches long, one-quarter of an inch wide, and one-eighth of an inch thick on the back. It should be ground to a sharp point with a straight cutting edge rather than from the front. The handle should be fairly stout so that it can be grasped readily. A strong, sharp jackknife could be used to advantage.

The head of the fowl is taken in the left hand and the knife in the right hand. With the thumb and forefinger of the left hand, the mouth is forced open by pressure and the knife is inserted into the mouth with the blade pointing toward the back of the head. The

knife is then forced up to the juncture of the head and neck where the arteries come down on each side of the neck; these are severed and the fowl bleeds freely. For a left-handed person the operation would be performed the opposite way.

Immediately afterward the knife is forced into the roof of the mouth. This is done by withdrawing the knife from the juncture of the head and neck and turning it over so that the back of the knife passes along the upper beak into the groove in the roof of the mouth. It is then immediately forced into the brain cavity so that the brain is pierced. When this is done properly the bird will squawk and it will also make a convulsive movement which tends

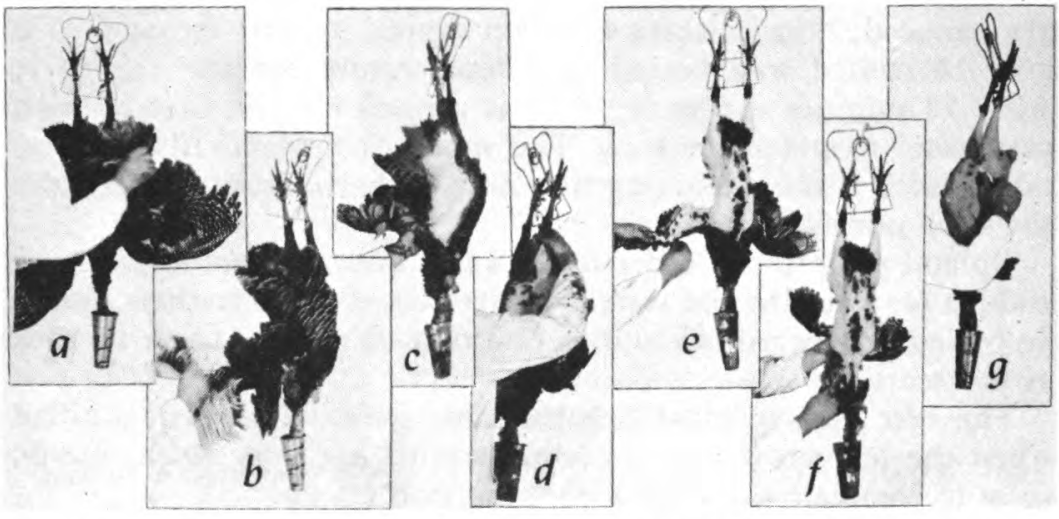


FIG. 137. Dry-picking of birds (feathers twisted and rolled out instead of pulled): (*a*) removing tail feathers; (*b*) removing large wing feathers; (*c*) removing feathers from sides; (*d*) removing feathers from legs; (*e*) removing feathers from back, hips, and wings (smaller feathers are picked with thumb and forefinger); (*f*) removing neck feathers; (*g*) removing pinfeathers.

to loosen the feathers in the feather muscles. If the brain has not been properly pierced, the feathers are hard to pluck and the skin is frequently torn badly. A blood can, weighted in the bottom, is hooked on to the lower mandible (beak) to catch the blood. The can also prevents the bird from moving too much.

In dry plucking, rapidity of movement is necessary. Different pluckers have different methods, but it has been found that the following order is convenient and rapid: wings, tail, breast, body, back, legs, neck and finishing of the wings.

As soon as the blood can has been hooked to the beak, a squeezing motion with the fingers around the neck from the base toward the head removes the feathers of the neck.

Then the wings are held firmly in the left hand, and the main wing feathers are removed with one jerk by the right hand, and the main tail feathers are given a slight twist, which should remove them with ease. The soft feathers covering the breast are removed readily by a sort of rubbing motion, rubbing the same way the feathers normally lie. The thighs and legs are easily plucked in much the same manner as the neck, and lastly the back and body of the bird are plucked. After plucking has been completed, pinfeathers may be removed by using a dull, round-bladed knife. Care should be taken not to tear the skin; even small blemishes lower the market value of the dressed bird.

Wet plucking after scalding the chickens is much simpler than dry plucking and is satisfactory where the dressed birds are sold locally or are not to be stored. Care should be taken not to have the water too hot (not more than about 190°F.), or the skin will be hardened or partially scalded.

After the bird has been dressed, the head and feet should be washed with a stiff brush. The vent should be squeezed, and if any feed remains in the crop it should be removed through an opening made just above the shoulders.

The head should be wrapped in parchment paper. Then the bird is put into a cool place, because it is necessary that the heat pass out of the body as soon as possible after the fowl has been killed. The dressed birds should be hung or laid separate from each other to allow the air to pass around all parts of the body. Proper cooling prevents bacteria from developing and tends to keep the fowls much longer.

Turkeys. Usually turkeys are killed and plucked in the same manner as chickens. Dry plucking is the method preferred for dressing turkeys for home use or local trade. Scald plucking may also be used if the turkey is to be consumed at home. Dressed turkeys should be thoroughly cooled as soon as possible.

Ducks. No feed should be given to ducks for at least 12 hours prior to killing. The bird is suspended by the feet; the jugular vein in the throat just below the base of the skull is cut through the mouth or stuck in the neck. A blood cup is attached to hold the head down and permit good bleeding.

When bleeding is completed, begin plucking or the dressed carcass is likely to be discolored. Ducks are plucked either dry or after being scalded. The temperature of the water should be just below the boiling point. If the water is not hot enough, plucking is difficult; and if the water is too hot or the ducks are left in it too long,

the skin is likely to be torn. When plucking is completed, plunge the bird into scalding water and pull it out quickly, then remove all pinfeathers with a small knife. Wash dirt off the feet with a damp cloth. Remove all blood from the head and bill. Squeeze vent to remove any feces, and singe the bird. After plucking, cool the bird thoroughly in cold water. Change water frequently in order to remove body heat quickly and to chill the duck thoroughly.

Geese. Care should be taken in handling geese at killing time as the flesh bruises easily, and the bruised spots detract from the appearance of the dressed product. Stick a goose in the same way as previously described for ducks. Hang a weighted blood cup on the lower bill to steady the bird and catch the blood. The dry plucking of geese is rather difficult, and the most common practice is to scald or steam the feathers before plucking. After geese are picked they are usually washed and put into ice water to cool.

Squabs. When squabs are fully feathered under their wings, which is when the birds are from 25 to 30 days of age, they are ready to kill and dress. They may be taken from the nests the evening before they are to be killed so that the crops will be emptied when they are dressed. If there is any feed in the crops after the birds are killed it should be flushed out. The usual method of killing squabs is to hang them by the feet on a hook or nail, and cut the jugular vein in the mouth just below the base of the skull, using a knife with a long slender blade. After bleeding, they should be dry-picked immediately, as the feathers are hard to pull out if the birds are allowed to get cold. Squabs may be picked on a bench or held in the lap. They should be picked clean and all pinfeathers removed. Care must be taken not to bruise or tear the skin for the skin of a squab is very tender. After squabs are plucked, they are washed and cooled promptly in cold water to remove all body heat. Squabs that are not properly cooled after plucking never make first quality birds, no matter how well they are chilled later.

Drawing Poultry

There are different methods for drawing poultry, but it is important to have an attractive carcass when the work is completed. Preparing poultry for the oven consists of removing the head, shanks, and feet and withdrawing the viscera or internal organs. The Pennsylvania State University Extension Service, in Circular 168, recommends the following procedure in dressing roasting chickens, broilers, and springers:

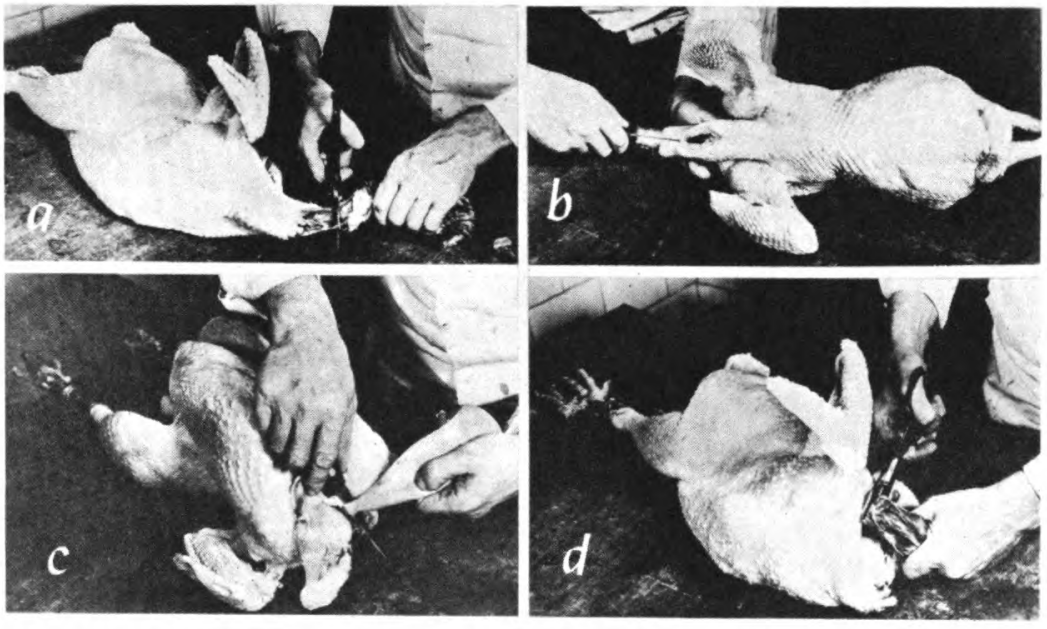


FIG. 138. Method of eviscerating a bird to be left whole: (*a*) removing head; (*b*) slitting skin down the back of the neck; (*c*) removing crop and windpipe; (*d*) removing neck.

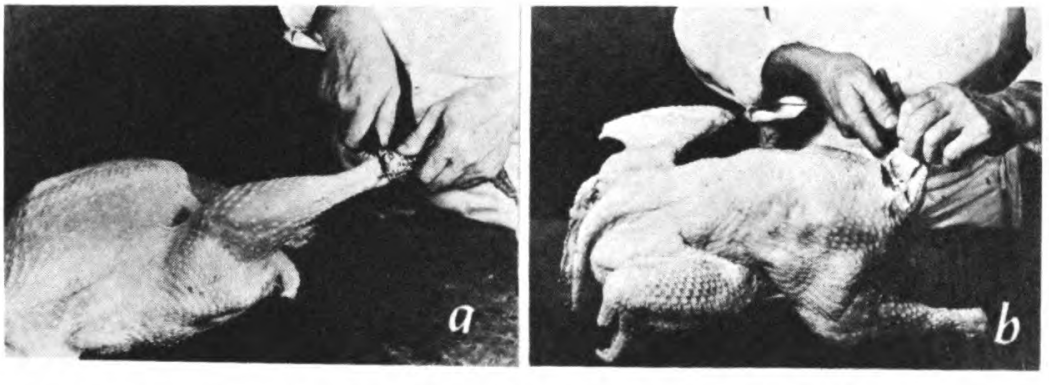
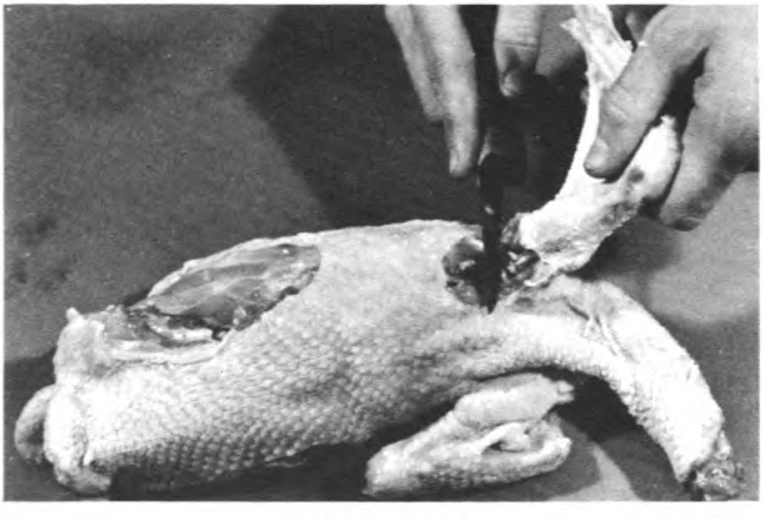


FIG. 139. (*a*) Cutting off the leg; (*b*) cutting out the oil sack.

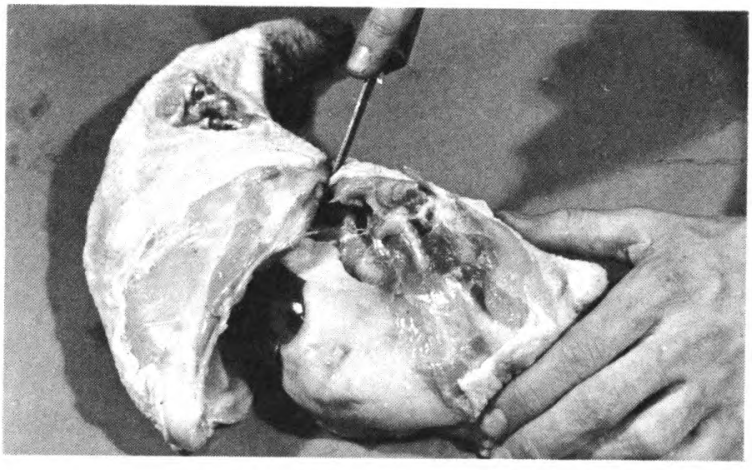
In dressing roasting chickens, first remove the head. Second, the neck can be removed by peeling back the skin and cutting off the neck close to the shoulders. This is done by pressing on the knife and moving it from side to side at the same time. This causes the blade to slip between two vertebrae. The prying action of the knife blade severs the neck from the body. Third, remove the crop and windpipe. The crop can be removed by hooking the short gullet between the crop and gizzard with a finger. Then pull the crop loose from the skin by working it forward. Fourth, insert a finger into the body cavity between the wishbone and loosen the lungs

FIG. 140. Cutting up a chicken: (*a*) removing legs at thighs

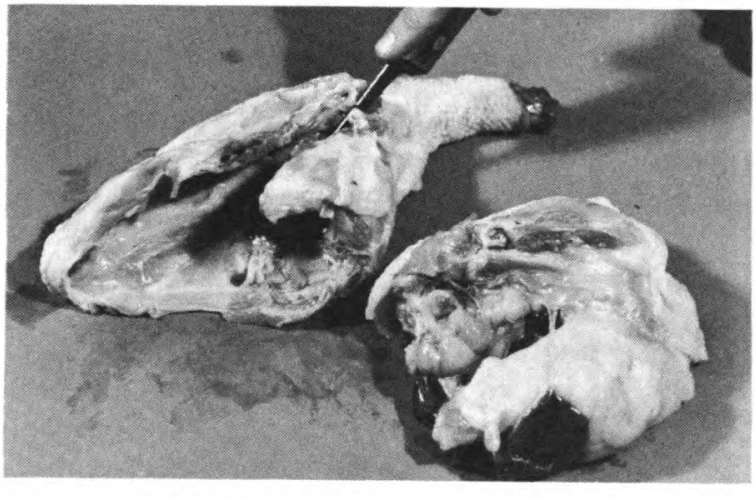
(*b*) cutting legs in two pieces at second joint



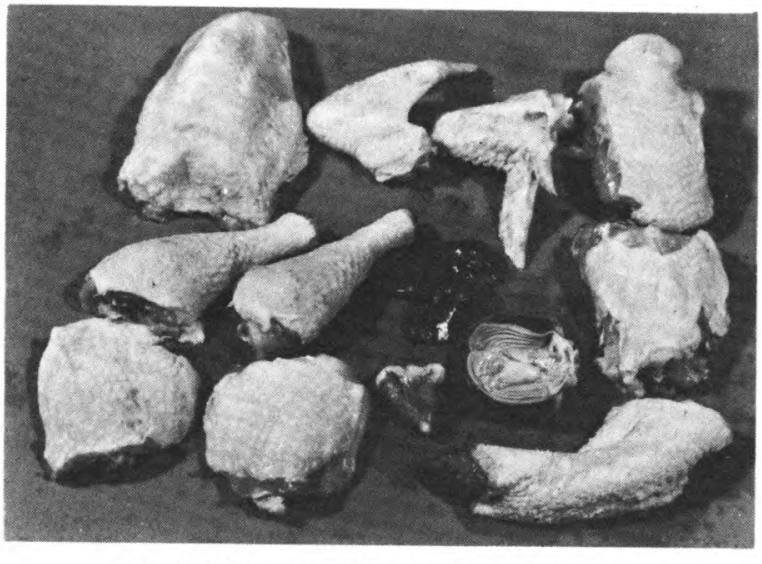
(*c*) removing wings



(*d*) cutting body in half



(*e*) splitting upper half of the breast



(*f*) chicken completely cut up into pieces

and other vital organs from the ribs and walls of the chest. Fifth, remove the feet at the hock joints, leaving a small bit of the hock skin on the hock joint. This will help to keep the skin anchored over the drumstick while roasting. Sixth, make an incision between the rear end of the keel bone and the rectum large enough to remove the contents of the body cavity easily. Cut around the rectum and draw out the lungs, heart, liver, and intestines. In fat birds it is best to remove the abdominal fat before the intestines.

After the vital organs are removed, examine the abdominal cavity for bits of lungs or other organs that may have been missed. Cool or partially cooled birds draw more easily than warm ones. The gizzard linings peel more easily when cooled and dipped in cold water. The gall bladder can be removed by grasping the lobes of the liver and letting the weight of the intestines pull down on the bile sacs. Then cut the gall bladder out of the liver.

Broilers and springers can be drawn by cutting them along the spinal column, starting at the base of the tail head. Both sides of the spinal column can be cut loose and removed with the neck. The bird can be laid open to remove the entrails. The two halves can be left intact at the keel after the entrails are removed, or they can be cut into halves or quarters.

Wild Fowl

Every precaution should be taken by the hunter to make sure his pheasants, quail, woodcock, doves, ducks, geese, and other game birds are fit to eat when he gets them home. Quite often during the first few weeks of the hunting season for birds there is a large percentage of warm days. This is especially true in the South.

It is not good practice to place warm, undrawn birds in the pocket of a hunting coat or bag and pack them around all day. Clots of blood caused by gunshot or partly digested food will taint the flesh and spoil the flavor. A too-common practice among hunters is not to eviscerate the birds but throw them in the automobile trunk or in the back of the car and forget them until the destination is reached. These are thoughtless procedures, for there is absolutely no chance for the body heat to escape and consequently the delicate meat spoils. Therefore, take time to remove the entrails and cool the birds as soon as possible after they are killed. Some hunters prefer not to eviscerate ducks and other small game birds in cool weather for they contend the meat becomes too dry.

Both game birds and waterfowl should be drawn as soon as possible—that is, the internal organs removed. Practice varies in different localities. Opening the body and removing the viscera undoubtedly exposes the internal surface to the air which always contains microorganisms, and this invites decomposition; but on the other hand, it must be remembered that the viscera decomposes more rapidly than other parts of the body, and if left in are likely to infect the rest of the bird. Of course, in removing them, great care and cleanliness should be observed.

How to Draw a Bird. With a knife slit the skin on the neck from the breast toward the head large enough to pull out the windpipe and the gullet or tube that carries the food. Then make another incision at the rectum and cut around it. Slit the abdominal cavity back far enough from the rectum to permit the withdrawal of the entrails. Care must be taken not to break the gall bladder which is attached to the liver lest the bile ruin the liver, heart, and gizzard which are edible. Save the giblets—they make a good stew. Cut the gizzard into the inner white lining or bag and remove it and its contents without cutting the gizzard in two. This bag cannot be removed so easily in waterfowl, so the gizzard must be split and the lining scraped out. When the entrails have been removed, wipe out the abdominal and neck cavities with a soft damp cloth. A more thorough cleaning can be given after the feathers are removed. Stuff a handful of grass or more if necessary inside the bird to allow air to circulate. Birds will keep much better if they are handled in this manner and carried outside rather than in a coat or bag.

Most small towns have a quick-freezing plant where birds can be hung until they are taken home. Frozen birds wrapped in several thicknesses of newspaper remain frozen for a long time.

Plucking. Feathered game should never be scalded for plucking but should always be dry-picked and the feathers pulled downward in the direction that they grow. Pulling upward or against the way they grow tears the skin which is usually very tender. If, however, the birds are to be hung for ripening, then they should not be plucked until the ripening period has ended.

To pluck the breast lay the bird on its back with the head outward, grasping it in the left hand over the wings and shoulders. Begin at the base of the neck, grasp as many feathers as can be handled between the thumb and side of the forefinger, taking hold near the skin. Then roll the right hand outwardly. This will remove neatly all feathers and down from a small area. Continue this method systematically by plucking row after row of feathers across the breast. This will leave a clean, pink skin.

With ducks and geese, owing to the thickness of the feathers, dry picking is a slower process than with other fowls. When the feathers have been removed, the down may be singed off with a flame from burning paper, or with gasoline or alcohol flame. A hot flame should not be used as it will give an oily appearance to the skin.

FIG. 141. Plucking a duck. Hold the duck in the left hand and pluck with the right hand. With the thumb and forefinger grasp feathers and down near the skin. Then roll the right hand outward.

A simpler method of plucking a duck is by the use of paraffin. Place a quantity of paraffin in a large saucepan and melt it over a slow heat. A bucket of cold water should be near at hand. Pluck all the large wing feathers and quickly immerse the duck in the melted paraffin, then quickly into the cold water. The paraffin will congeal and can be pulled off in chunks, bringing the feathers, including the pinfeathers, with it. The paraffin can be reclaimed by melting and straining out the feathers through a fine sieve or cheesecloth.

Fowls have an oil sac at the base of the tail, and this should be removed after the bird is plucked. Never cook a bird without first removing the triangular piece of flesh at the base of the tail head in which the oil glands are imbedded.

FIG. 142. Remove pinfeathers with a small knife pressed against thumb and feather.

FIG. 143. Singeing with an alcohol flame to remove hair and down feathers.

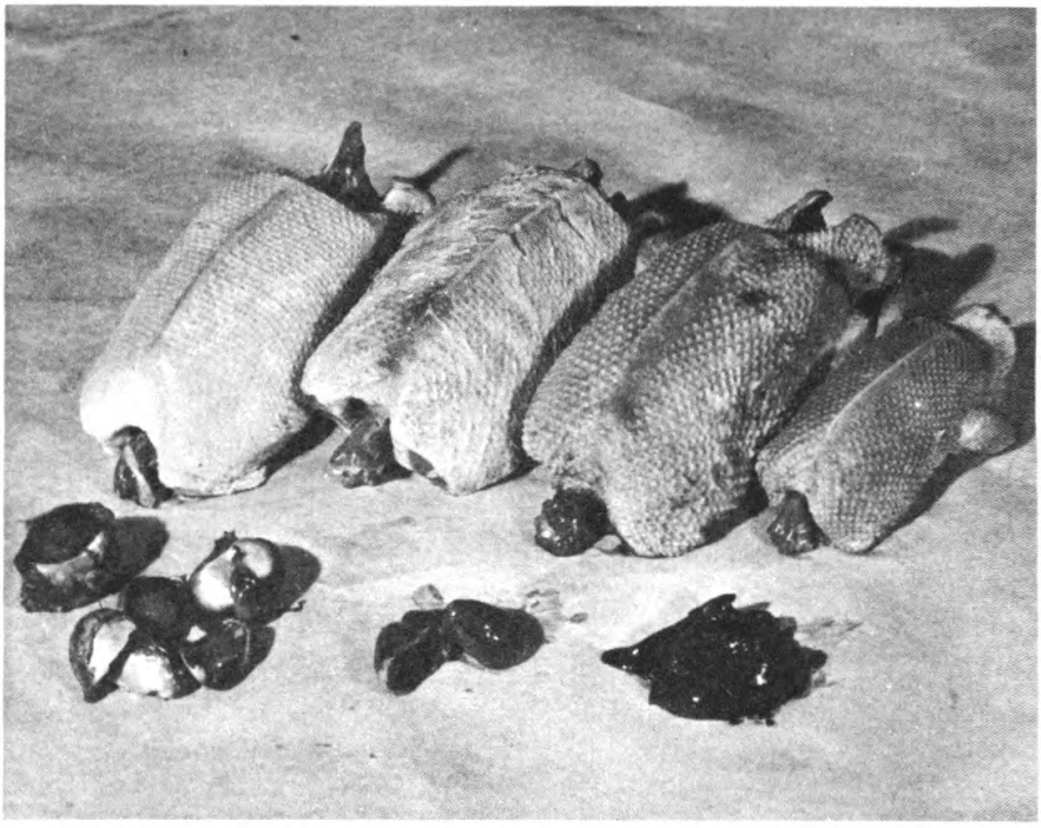


FIG. 144. Ducks and "giblets" ready for cooking.

XII

PROCURING, CLEANING, AND CUTTING FISH

Today the modern housewife can obtain almost any kind of fish she wants—fresh or frozen—in fillet or steak form. It is also possible for her to buy fish in the retail or wholesale markets in the round (just as it comes from the water), drawn (which means the entrails have been removed), or dressed (scales, entrails, head, tail, and fins removed). Fish is marketed in various forms for different uses. To buy intelligently requires a knowledge of these commercial forms or "cuts." So to aid the consumer in purchasing fish the U. S. Fish and Wildlife Service has prepared illustrations and descriptive material which are presented here.

Purchasing Fresh Fish

When fish are purchased in the round be sure they are fresh. Examine the eyes. Fresh fish have bright, clear, bulging eyes; the gills are reddish-pink, free from slime or odor; the scales adhere tightly to the skin and are bright colored with characteristic sheen; the flesh is firm and somewhat elastic, springing back when pressed, not mushy or separating from the bones; and the odor should be fresh and free from objectionable odors. Most fish delivered to our ports have been iced for several days or more aboard the fishing boat.

Fish, like many other food products, will spoil easily if not handled with care. When fish is received from the market, it should be wrapped in moisture-proof paper or placed in a tightly covered dish and stored immediately in the refrigerator. Stored in this manner, the odor of fish will not penetrate other foods. If fish cannot be thoroughly refrigerated, it should be cooked at once and reheated for serving.

Purchasing Frozen Fish

Most varieties of fish can be purchased frozen, and they are available the year round. Frozen fish can now be obtained by the consumers who live near or far from the source of supply. Frozen fish may be used interchangeably with fresh fish.

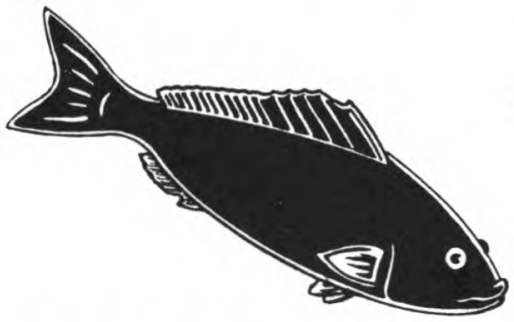


Fig. 145. Whole or round fish are those marketed just as they come from the water. Before cooking, they must be scaled and eviscerated (which means removing the entrails). The head, tail, and fins may be removed if desired, and the fish either split or cut into serving-size portions, except in fish intended for baking. Some small fish, like smelt, are frequently cooked with only the entrails removed.

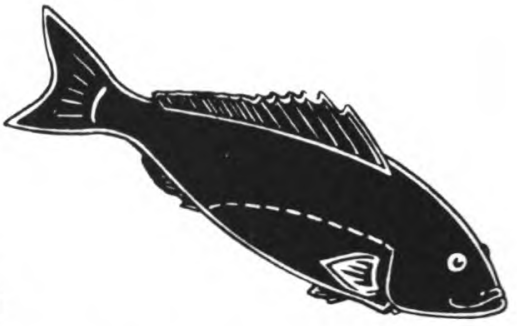


Fig. 146. Drawn fish are marketed with only the entrails removed. In preparation for cooking, they generally are scaled. Head, tail, and fins are removed, if desired, and the fish split or cut into serving-size portions. Small drawn fish, or larger sizes intended for baking, may be cooked in the form purchased after being scaled.

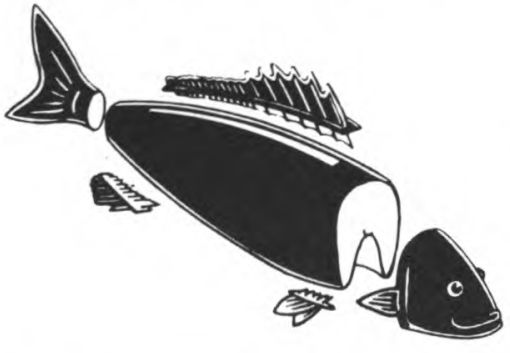


Fig. 147. Dressed or Pan-dressed. Dressed fish are scaled and eviscerated, usually with the head, tail, and fins removed. The smaller sizes are ready for cooking as purchased (pan-dressed). The larger sizes of dressed fish may be baked as purchased but frequently are cut into steaks or serving-size portions.

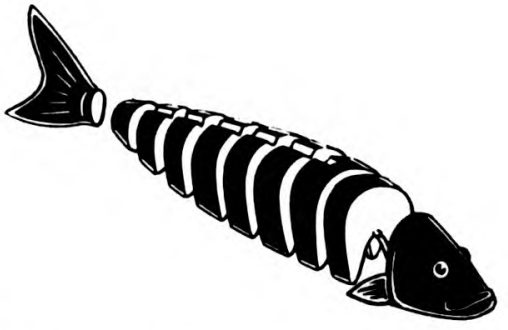


Fig. 148. Steaks are cross section slices of the larger sizes of dressed fish. They are ready to cook as purchased, except for dividing the very largest into serving-size portions. A cross section of the backbone is usually the only bone in the steak.

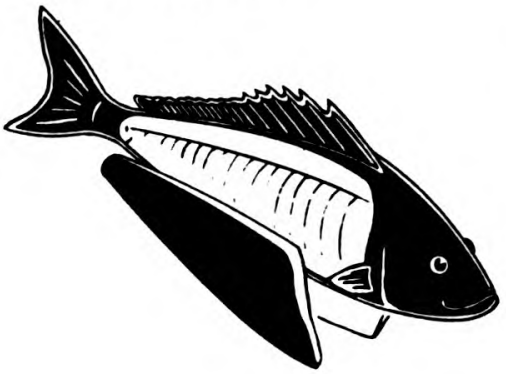


FIG. 149. Single fillet. The sides of the fish, cut lengthwise away from the backbone, are called Fillets. They are practically boneless and require no preparation for cooking. Sometimes the skin, with the scales removed, is left on the fillets; others are skinned. A fillet cut from one side of a fish is called a single fillet. This is the type of fillet most generally seen in the market.

FIG. 150. Butterfly Fillets are the two sides of the fish corresponding to two single fillets held together by uncut flesh and the skin.

FIG. 151. Sticks are pieces of fish cut lengthwise or crosswise from fillets or steaks into portions of uniform width and length.

Frozen fish is generally wrapped in parchment paper or cellophane. Before placing it in the refrigerator it should be enclosed in another wrapping of paper. This will prevent the absorption of odors by other foods as the fish thaws. Frozen fish should remain in the unopened package until time to use.

To keep frozen fish for several days, place the unopened package in the freezing unit or frozen foods compartment of the refrigerator. Fish will keep as long as it is solidly frozen, but once it thaws it should be used immediately. Never refreeze fish after it thaws.

CATCHING FISH

When the fisherman of the family is relied upon to supply the fish, he should be careful in handling them. They should not be permitted to flop around on the bank or in the bottom of a boat to become bruised. The fish should be killed immediately after being caught, preferably by a method which will permit the blood to drain from the flesh. The viscera and gills should be removed immediately, and the dressed fish packed in ice or wrapped in wax paper and placed in a refrigerator as soon as possible.

How to Clean Fish

One never can tell when the husband or the boys are going fishing, or when a kindly neighbor will proudly present the little woman with part of his catch. This happens most unexpectedly, so one must be prepared for this emergency. It is easier when you know how. This is how you go about it.

Scales come off a wet fish easier than a dry one, so soak the fish in water before you begin to scale it. Lay the fish on a cutting or chopping board. Grasp the fish firmly with one hand by the head. With a saw-toothed knife or scaler, scrape off the scales, working from the tail toward the head. Do a clean job and work off all the scales near the base of the fins and head.

Now cut a slit in the fish's belly, from head to the vent (anal opening) and remove the entrails. Cut off the head, including the pectoral fins, by cutting above the collarbone. If the backbone is large, cut down to it on each side of the fish. Snap the backbone by bending the head over the cutting board or table. Now cut off the head and tail. Remove the fins by cutting into the flesh on both sides of the fish at the base of the fins. Then the fin and fin bones can be pulled out easily. Never trim the fins off with shears or a knife since the bones at the base will be left in the fish. Wash the fish in cold running water to remove blood and all remaining scales, viscera, and membranes.

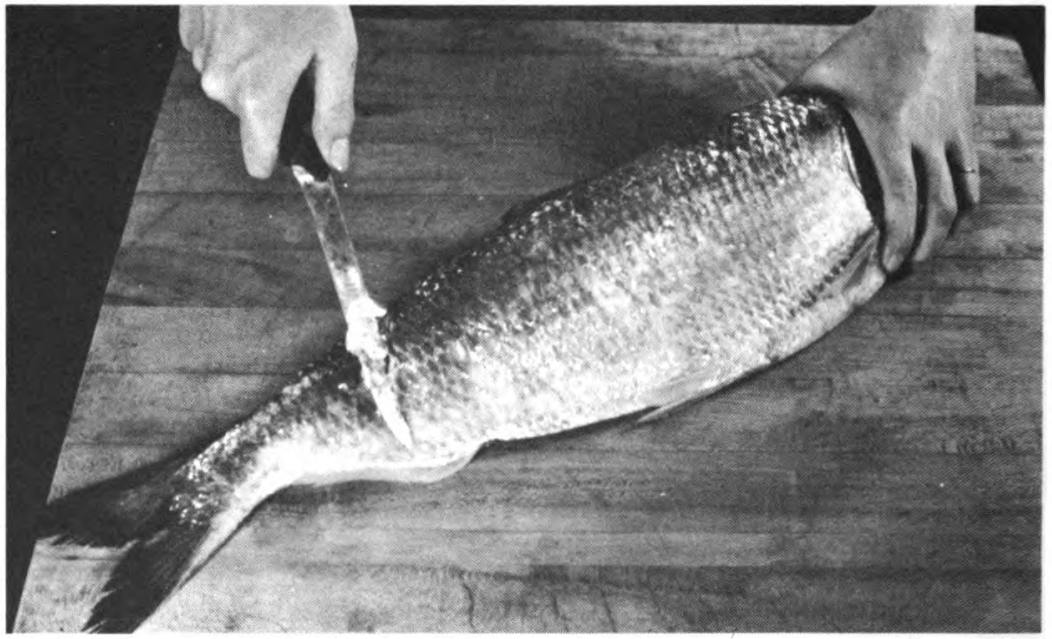


Fig. 152. Scaling fish. Use dull blade or back edge of knife.

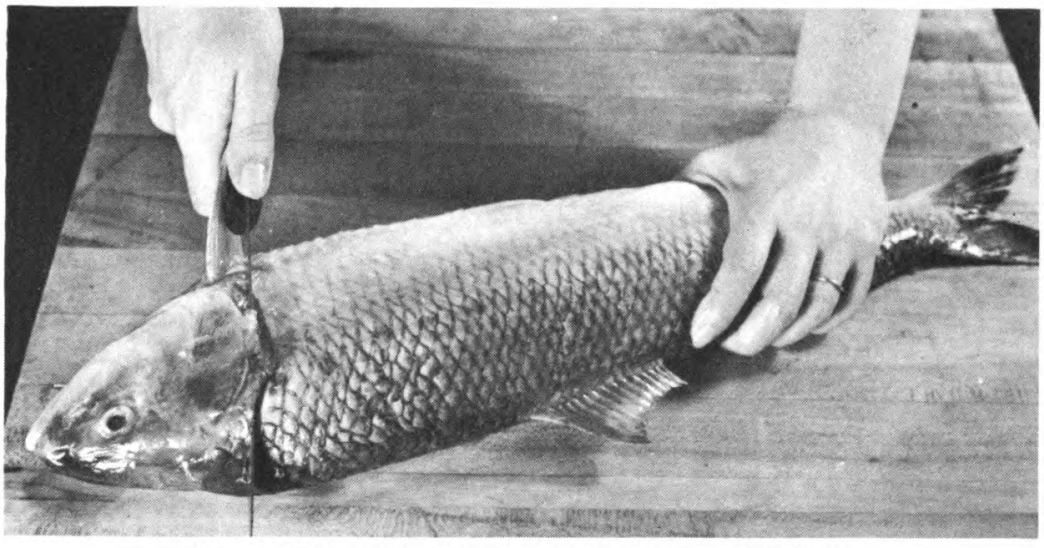


FIG. 153. Removing head. Cut above the collarbone.

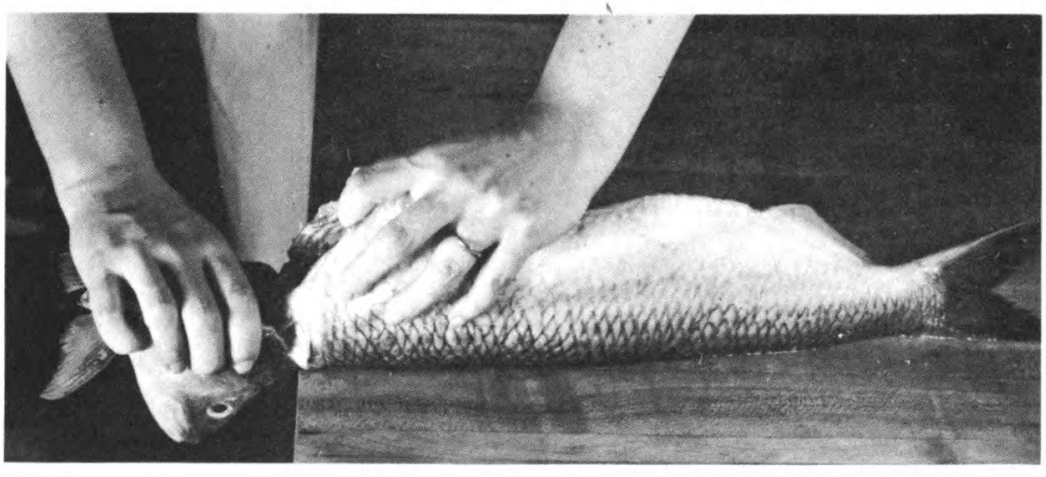


FIG. 154. Breaking backbone.

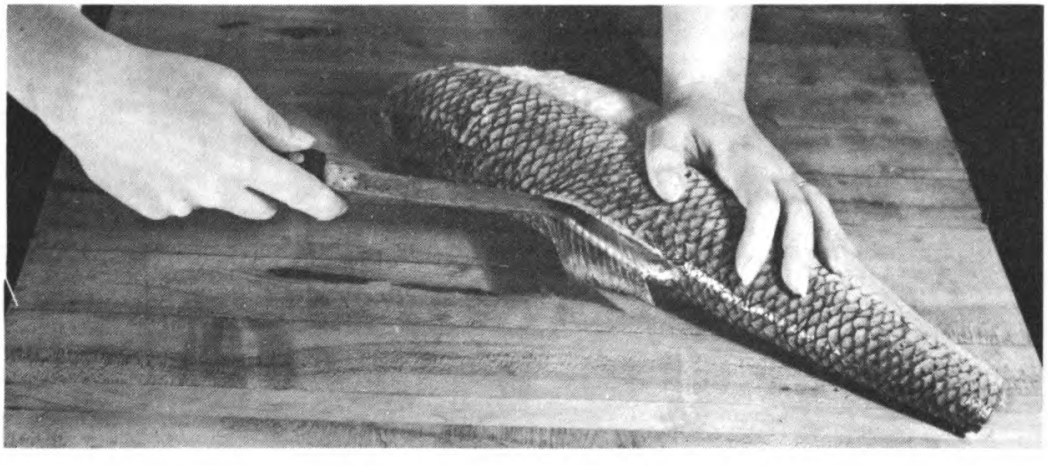


FIG. 155. Cutting to remove dorsal fin.

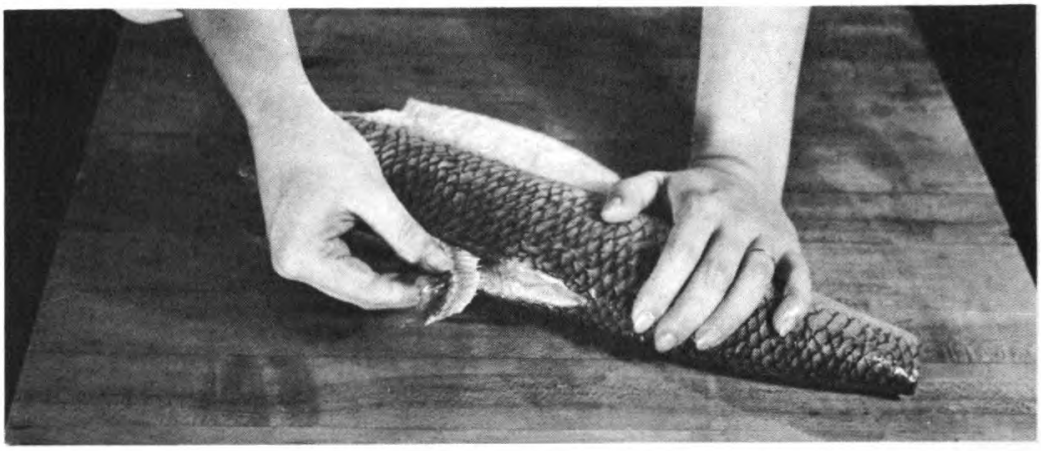


FIG. 156. Removing fin.

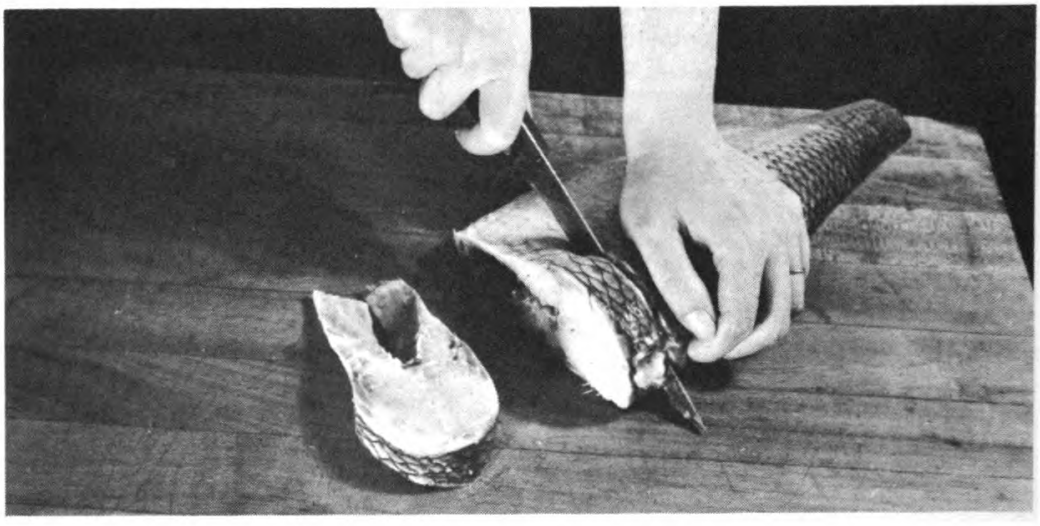


FIG. 157. Cutting a steak.

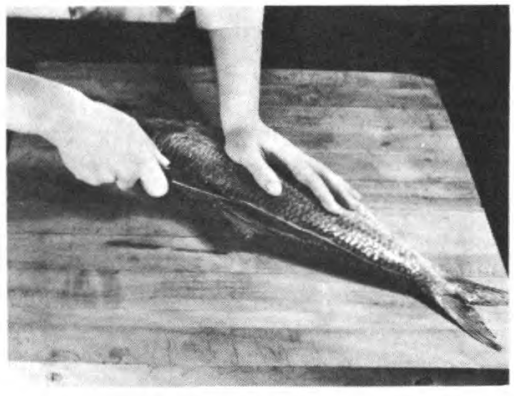


FIG. 158. Cutting fillet from tail to head.

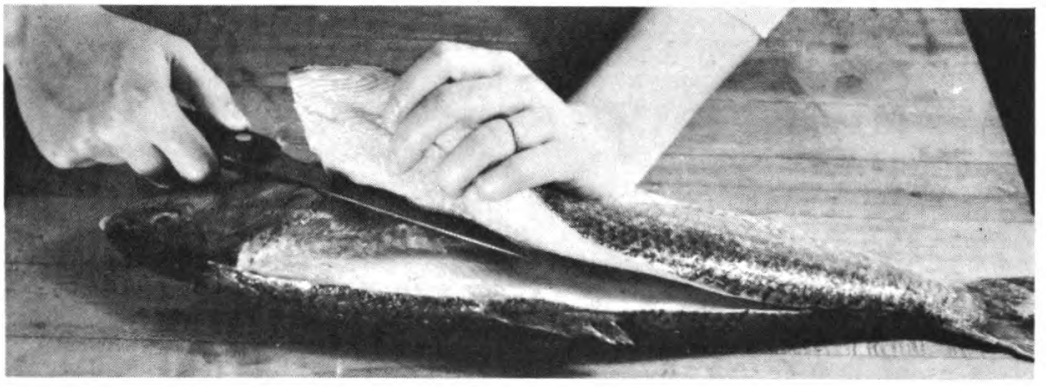


FIG. 159. Cutting along backbone to remove fillets.

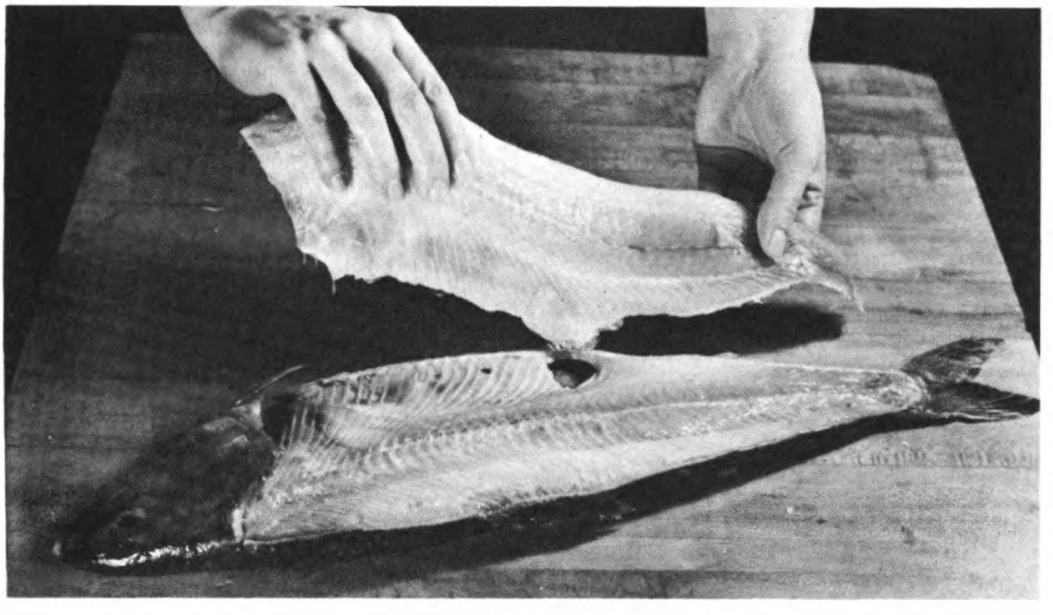


FIG. 160. Freeing fillet at the tail.

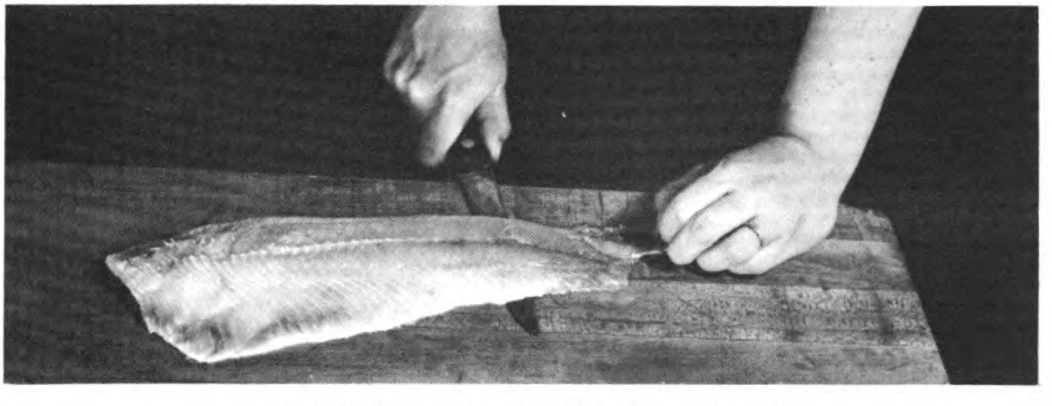


FIG. 161. Removing the skin from the fillet.

XIII

PRESERVING MEAT, FOWL, AND SEAFOOD

There are different methods of preserving meats, such as freezing, curing, drying, smoking, and canning. Freezing is the most popular means by which families can store their food supply. It is a practical and desirable way to preserve meats and by far the easiest method. Freezing, however, is not the only way to preserve meats for family meals. Some of the other methods are still quite popular, for they produce an entirely different product such as corned beef, hickory smoked ham, and canned meat products that many families will enjoy for quick meals and variety. Freezing is best used to supplement other methods of meat preservation.

FREEZING

The frozen-food locker in a freezer-storage plant or in the home has proved an excellent facility for maintaining an ever ready supply of a wide variety of meats at moderate cost. The home freezer in the kitchen is practically a member of the family in the homes of millions of farmers and city dwellers alike. Where home freezers and efficient cold-storage locker plants are available, frozen meat can be kept satisfactorily for 6 months to a year.

Freezing is the only known method by which meat and meat products can be preserved in a condition similar to their normal state. These frozen products resemble fresh meats in appearance, flavor, and food value, and add desirable variety to cured, smoked, canned, and dehydrated meats.

The modern frozen meats bear little resemblance to the "cold storage" products of former years. Modern refrigeration equipment has made possible more uniform near-zero storage temperatures. Coupled with this has been the discovery of better methods for

selecting, preparing, packaging, and freezing products prior to storage. Most of the original goodness of meat and meat products can be preserved in the frozen product if proper methods are used. On the other hand, even solidly frozen meat will dry out and lose flavor and nutritive value if not properly prepared or stored. An understanding of the changes that may take place in frozen meat will help the family to guard against loss.

Chemical Action Caused by Enzymes

Meat experts in the U. S. Department of Agriculture,* tell us that meat starts to freeze at about 29°F. As the temperature drops to 15°F. or lower, the growth of microorganisms ceases, and hydrolitic enzyme action on protein and fat becomes slight. At about 15°F. the oxidation of the fat, which is caused largely by the accelerating effect of enzyme action, begins to become the chief, if not the sole, kind of composition. That type of breakdown progresses slowly at first, but, as decomposition products accumulate, it gains velocity. Because of its greater exposure to air, the surface always oxidizes more rapidly than the inside fat. Modern freezer storage is usually at 0°F. or lower. Because of differences in chemical constitution and activity of enzymes, animal fats vary considerably in their tendency to oxidize. Pork fat oxidizes much faster than beef or lamb fat.

Although freezing at 0°F. for 24 hours is reported to kill trichinae, the Department of Agriculture recommends different holding periods, depending on the temperature and the thickness of the cut or pack.

For instance, the recommendation for pork 6 to 27 inches thick stored at 5°F. is 20 to 30 days; at −10°, 10 to 20 days; at −20°, 6 to 12 days.

Ice Formation in Meat

When water in meat juice freezes it draws pure water to the ice crystals and leaves behind the coloring, flavor, and food material that has been dissolved or suspended in it. Freezing is a kind of drying process which produces changes in the composition of the meat. These meat juices are not re-formed when the meat thaws. However, when meat is quickly frozen, these changes are slight. When meat is frozen slowly, the changes may be so great as to cause

* Hankins, O. G., Hiner, R. L., Sulzbacher, W. L., Gaddis, A. M., *How to Keep Meat from Spoiling*: The Year Book of Agriculture, 1950-51.

a loss of quality. There is also some rupture or tearing of the cell tissues as the ice crystals form and expand.

Rapid freezing produces minute crystals which are rather evenly distributed through the meat. When such a product is thawed, the moisture is reabsorbed as the crystals melt. There are three different methods of quick freezing—direct immersion in low-temperature brine, indirect contact with the refrigerant, and air blast.

Drying or Freezer Burn

The air in most freezers is dry. This is so because the refrigerator coils freeze much of the moisture out of it. This dry, cold air drops from the coils toward the floor and circulates around the frozen food and absorbs all the moisture it can find. Meat frozen and stored without protective wrapping at 15°F. will remain wholesome and edible for some time, but the loss of quality is quite rapid. Through the weeks of storage this drying-out process removes ice from the exposed meat. This causes a dry, pithy surface or "freezer burn" to develop on the frozen meat. The meat changes in color, develops undesirable flavors, and becomes dry and hard. It may be well preserved, but no longer does it resemble fresh meat in flavor, texture, and appearance.

This surface drying on meat in a home freezer or in a locker is not serious, although under unfavorable conditions it may become severe enough to cause a real loss of quality. To prevent this drying, considerable care is required in selecting the proper vapor-proof wrap or container and to be sure that the meat has been packaged and sealed effectively.

Cut to Fit Family Needs

Select animals or dressed carcasses with the weight that will give the size of steaks and roasts desired. Popular weights are: hogs, 200–250 pounds; calves, 150–250 pounds, steers or heifers, 600–1,000 pounds. All animals must be healthy. Suitable veterinarian inspection is available in many localities, and its use should be encouraged.

Slaughtering, chilling, aging, or ripening and cutting for all meats has been discussed previously. However, a few additional suggestions for the proper cutting of meat for freezing will be given here. The main considerations are the family needs and the cooking methods adapted to the tenderness of the meat to be cooked. The proper cutting method, then, is to separate the tender steaks

and roasts from pot roasts, stew meat, and meat that should be ground.

Remember the best carcass contains many muscles that are too well filled with connective tissue to be tender unless the tissue is slowly softened by braising or stewing. The thin, less tender shanks, neck, brisket, plate, and flank must be prepared for pot roasts, or ground.

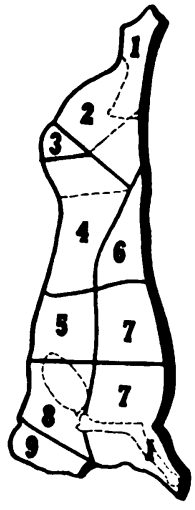
The thick, heavy muscles of the shoulder and rump from young, well-fattened cattle make reasonably tender roasts and steaks. They are, however, more truly pot roasts and Swiss steaks and not so well adapted to oven-cooking, frying, or charcoal-broiling as the meat in the rib and loin (rib roasts, T-bone, and sirloin steak). If the carcass is thin and from an older animal, even the loin and rib cuts may be better suited to braising than to frying.

With these considerations in mind, examine the carcass for quality and proceed to make the cuts according to the way they should be cooked. Also, the size of the cuts can be made to suit the family's preference.

The approved methods for cutting beef, veal, and pork carcasses for freezer storage are given below.[1]

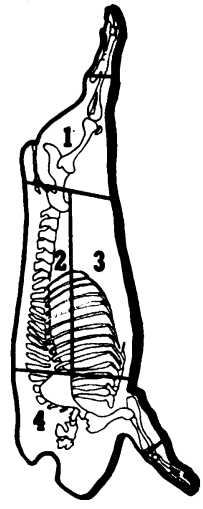
CUTTING METHODS FOR BEEF AND VEAL

The tender loin (4) and rib (5) are suitable for broiling, frying and roasting; the chuck (8), rump (3), and round (2), for Swiss steaks and pot roasts; the thinner shanks (1), flank (6), plate (7), and neck (9) for stew and ground meat.



CUTTING METHODS FOR PORK

Cut or slice the thick ham (1), loin (2) and shoulder (4) into roasts, steaks or chops. Trim the bacon strip (3) for curing, or cut into boiling pieces. Trim all meat closely, using lean for sausage and fat for lard.



The size of roasts, number of steaks, amount of ground meat, proportion of fat in the sausage, and the quantity in each package must be decided by size of the family. Thickness of steaks can also be suited to family requirements. One advantage of a home freezer or a locker is the opportunity to have inch-thick steaks at all seasons of the year.

Percentage of Cuts Expected

Animal	Trimmed cuts	Live weight lb.	Carcass weight lb.	Trimmed cut total weight lb.	Per cent of trimmed cut weight in each cut
Veal		150	90	70	
Beef		1000	580	450	
	Steak and oven roasts				40
	Pot roasts				20
	Stew and ground meat				20
Lamb		100	50	35	
	Legs, chops and shoulders				75
	Breast and stew				15
Pork		225	180	115 plus 30 lard	
	Ham, shoulder, bacon and jowls				50
	Loins, ribs and sausages				20
	Rendered lard				15

[1] Courtesy of the Agricultural Extension Service, Iowa State College.

All lamb cuts can be made tender by slow roasting, and lamb can be cut up most satisfactorily for freezer storage.

Boning all the cuts from a side of beef or lamb reduces the storage space required by about one-fourth. Trim all the cuts closely to save space. Sharp edges of bone that may puncture the wrapping paper should be removed.

A large variety of meats can be frozen in the home freezer and then later thawed and cured as you like them. It is quite possible to have delicious, fresh pork sausage or fresh cured breakfast bacon in June or July from hogs that were butchered in late fall and early winter.

For freezer storage of fresh pork, hams can be cut into good, usable sized pieces—pork shoulders as rolled picnics; Boston butts can be boneless or left with the blade bone in. Bacon sides can be cut into convenient 3- or 4-pound pieces.

Loins can be boned, cut in half, and later cured as delicious Canadian-style bacon. Jowls, when cured, can be used for boiling

or frying. Pork trimmings can be used months later for making fresh pork sausage; hog-head meat, for making headcheese any time of the year. Sausage is often frozen without seasoning, as the aromatic flavor of the spices may disappear during several months of storage. If the seasoning is added before freezing, be sure that the sausage is packaged in a vapor-resistant wrap or container.

Beef can be taken from the freezer and cured as corn beef or dried beef, and tongues when cured can be cooked and used for hot or cold meals or served as cold cuts.

Freezing, curing, smoking, and canning game, including fish, in some states is definitely restricted, and the meat is subject to possession limits during closed seasons the same as fresh game. Consult your local game warden or locker operator for regulations regarding legal periods for storage of game and fish.

Packaging Meat for Freezing

The ideal wrapping for meat to be frozen must resist water vapor and gases, have good tensile strength and pliability at all temperatures, be odorless and nontoxic, and be easily peeled from the frozen meat. It can be sealed with heat, is easy to mark for identification, and is moisture- and stain-proof.

No existing wrapper or container possesses all these qualities. Each home processor must select the one or ones best suited to the meat and meat products handled, to the available storage conditions, and to the length of the intended storage period.

Films, foils, and laminates are among the most effective wrapping materials available. Different kinds of films are available for packaging. Among them are the cellophanes or cellophane-like films, such as polyethelene. The only foils used for wrapping foods are aluminum foils. Use only the freezing-weight foil (.0015 gauge) to package frozen meat. Laminates are made of two sheets of material stuck together. The inner sheet protects the product; the outer resists scuffing. Films and foils are more subject to scuffing, tearing, and puncturing, and may require some protection. Ordinary waxed freezer papers are not satisfactory for packaging meat, fish, or poultry, because they are no guarantee against oxygen moisture. Butcher paper and kraft paper should not be placed against the food; they should be used only to protect the inner wrap.

The best wrapping material is of little value unless it is properly applied. A good plan to follow in selecting the proper wrapping for frozen meat is to give the best protection to the products that are

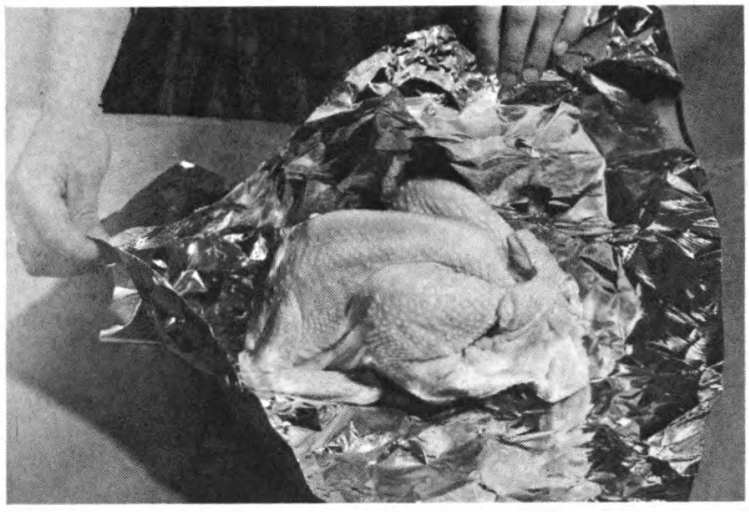


FIG. 162. Drugstore wrap. Place meat in center of a suitable wrapping material.

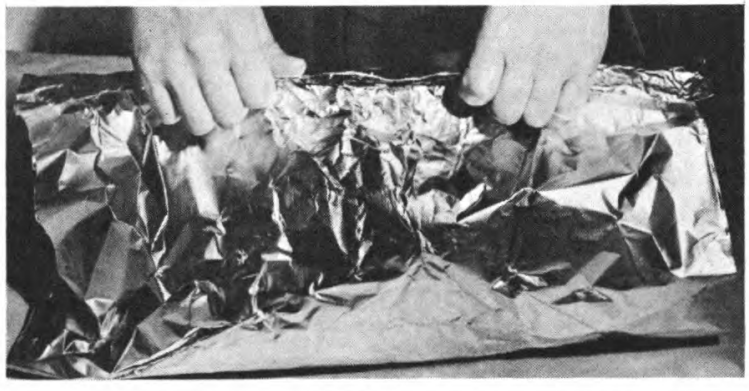


FIG. 163. Bring two edges of wrapping together and fold.

FIG. 164. Press and mold wrap firmly against the meat. Pull folded ends tightly.

to be stored for 6 months or longer. Use the less effective, cheaper coverings for the others. Seasoned sausage should have airtight protection.

When frozen meat is removed from freezer storage, examine it carefully for drying. In your home freezer or locker the cheaper material may be good enough for long storage, or it may be necessary to put a more effective vapor-resistant covering on all foods. The same wrapping materials are used for meat and poultry.

Freezing does little to improve meat and only tends to maintain its original condition. Therefore, care is essential in choosing meat to be stored. Lean cuts generally store better than fat cuts. Ripened or aged meat tends to lose quality more rapidly than unripened. Beef and lamb should be held in the cooler only a few days. Pork should be stored immediately after the animal heat has left the carcass. Pork turns rancid if kept much longer before freezing. Freeze veal, liver, heart, and other specialty meats immediately after chilling. Veal loses quality rapidly after chilling, so it requires immediate freezing. The liver, heart, and sweetbreads are not protected by fat and are quite moist. They are easily contaminated and very perishable. Not only should they be frozen immediately after chilling, but they should be used a few weeks after freezing.

Beef, Veal, Lamb and Pork. Cut the meat into such sizes as you will wish to remove from the freezer and use at one time. Be sure to remove all sharp edges or corners from the meat and poultry that might puncture the paper. Put the meat in as compact a form as possible. This will save storage space and paper and make wrapping easier.

Pull the wrapping material tight, and smooth down to force out the air. Folding the two edges of paper together and over until tight against the meat, as a drugstore clerk wraps a box of candy, reduces air leakage through the seam. Fold the ends of the paper together and turn them under the package. Pull the ends tight and then heat-seal, tie, or seal with freezer tape. The seam may be also heat sealed or taped.

Cellophane, latex, and some double-waxed paper can be sealed by heating the top fold of the bag or the seams of the package with a moderately warm flatiron or curling iron. Use just enough heat and pressure to melt the paper or wax until it seals. If the seal is scorched, a new seal or a new wrapper should be used. If it is not possible to seal the package by heat, then proper folding and sticky tape can be substituted. Ordinary gummed tape is not satisfactory; a special tape is made for this purpose. Remember that careful wrapping and sealing are as important as good wrapping material.

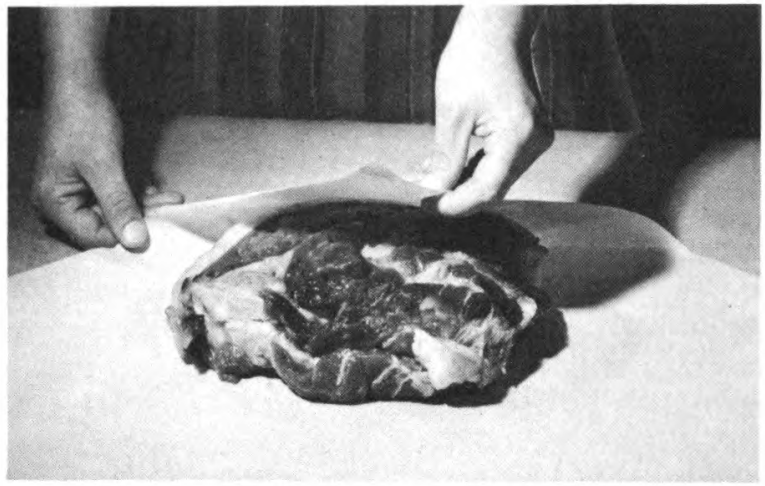


FIG. 165. Butcher-type wrap.

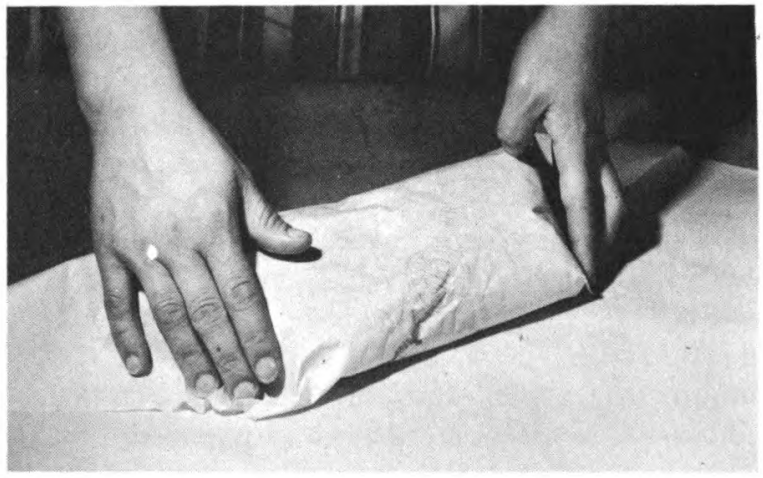


FIG. 166. Turn the meat over completely, twice, pulling the paper tight as the meat is turned. Mold tightly to exclude air.

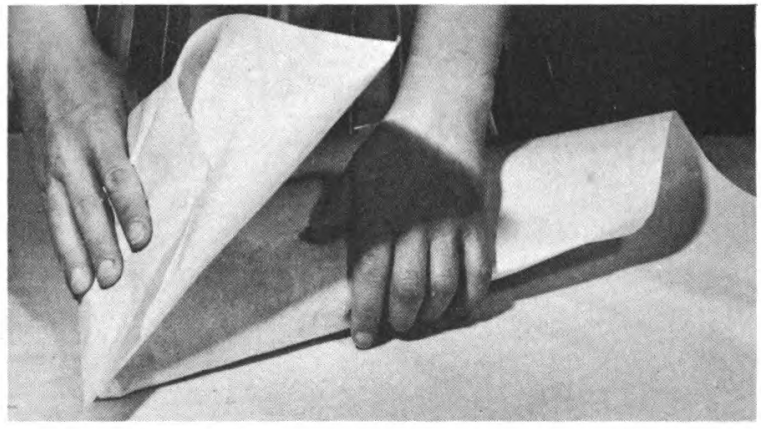


FIG. 167. Fold for double thickness everywhere.

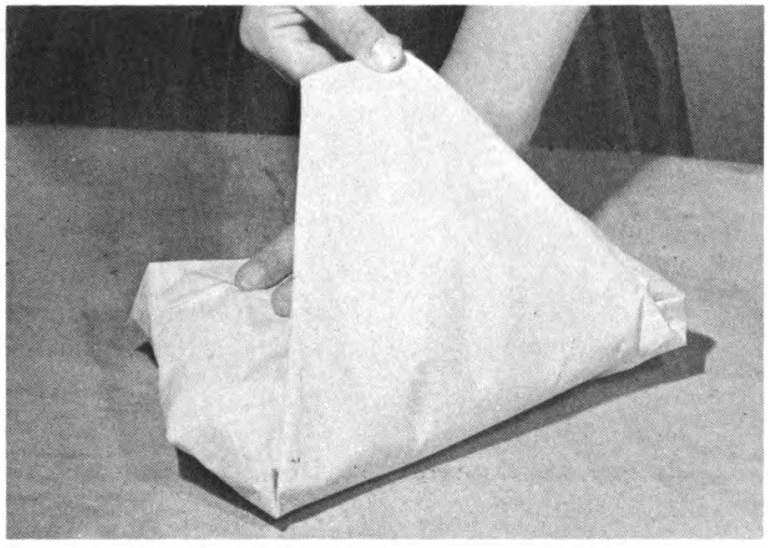


FIG. 168. Fold in sides and ends to exclude air, then tie or tape.

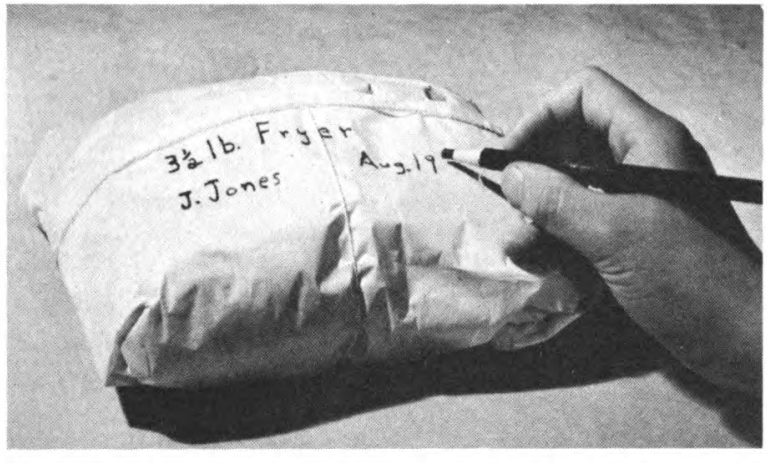


FIG. 169. Label each package. Include kind and cut of meat, weight and date of freezing.

The U. S. Department of Agriculture suggests that emergency cover or homemade bags can be made by heat-sealing the edges of strip cellophane, latex, or double-waxed paper. A strip of 7 x 21 inches will make a 6 x 10 inch bag with half-inch folds along the seam and a 1-inch flap at the top.

Poultry. Any day in the year may be poultry day. Chicken, turkey, duck, goose, and game birds can all be preserved in the home freezer. One convenient arrangement is to pack the meaty pieces (breast and legs) separately from the bony parts (backs, necks, and wings).

FIG. 170. Plastic bags containing meat should be plunged in water to remove air. Twist top shut and tie.

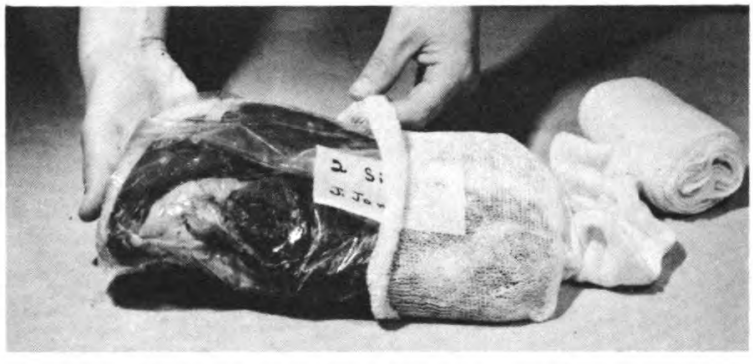


FIG. 171. Meat packaged in films, foils and laminates are subject to scuffing, tearing and puncturing; stockinette material serves as protection. Label package and insert in stockinette.

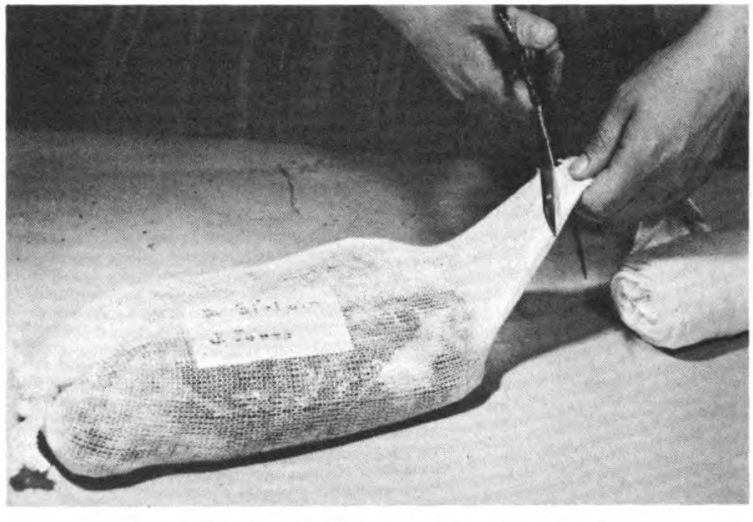


FIG. 172. Pull stockinette tight and tie.

Giblets, livers, hearts, and gizzards have a short storage life. They should be packaged separately and eaten within 3 months. If many birds are dressed at one time, package the livers and freeze for that special occasion when broiled or sauté chicken livers are served. Cool the gizzards and hearts and pack for freezing.

Cut-up chicken, because it can be packaged flat, requires little freezer space. Chilled poultry, however, may be dressed for freezing and storage in different ways.

Broiler-fryer chickens are quite popular for home freezing. Fryers weighing 2½ to 4 pounds, 10 to 16 weeks of age, are most desirable. Many prefer to cut the chicken into regular frying pieces and pack them into cellophane-lined rectangular cartons. A quart container will hold an average-sized fryer. Just before sealing the package add about one-half cup of water—enough to encase the pieces in ice. The water forced the air out. If the giblets are included, be sure they are first packaged separately in locker paper.

Broilers may be prepared by splitting down the back with a sharp knife or kitchen scissors. Cut down both sides of the backbone and remove it if desired. Dip the broiler halves in water and place skin down on packaging material. Place two pieces of wrapping material between the halves so they can be separated when frozen. Package in films, foils, or laminated packaging materials.

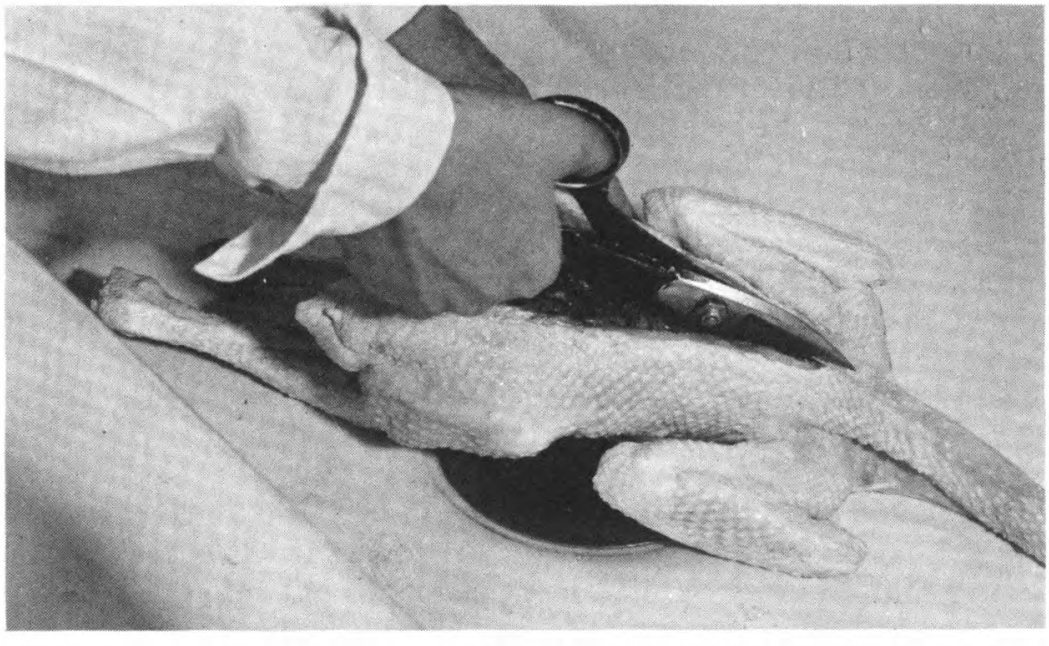


FIG. 173. Broilers may be prepared for freezing by splitting the bird into halves with the kitchen shears and cutting along both sides of the backbone and removing it.

Roasters—those large, well-fleshed birds—are left whole after dressing. The neck and feet are cut off and the legs and wings are tied tightly to the breast to save storage space.

Pieces of chicken, turkey, and other poultry are often frozen in small packages. Divide the bird into portions required for one meal. Usually the meaty pieces are put into one group, and the bony pieces in another. Place each meaty piece in a fold of cellophane to prevent freezing together. Package wet or add water just before sealing. Allow no space for air pockets. Tie, heat-seal, or tape to keep package air- and vapor-tight.

Bony pieces, necks, backs, and wings may also be cooked until the meat falls from the bones, then frozen or canned with the broth for stews, pies, or fricassee. Like other pre-cooked meats, cooked poultry may be frozen, but the storage life is quite short.

Fish. Fish of all types and kinds, both salt and fresh water, can be preserved perfectly when frozen. This includes shellfish—shrimp, lobster, crab, and the like. Preparing them for freezing is simple, but it should be done immediately. Freshness is indispensable to well-flavored, palatable, and wholesome sea food. Stale odors and flavors, as well as spoilage, develop rapidly when fish are removed from the water and held at warm temperatures. Letting the fish you buy or the fish you catch get warm before you pack it away in the freezer is bad business. Keep it in a fine state of chill and you'll have a fine fish when you remove it from the home freezer.

Like beef and pork, the quality of frozen fish and shellfish is determined to a large degree by the quality of the product at the time of freezing and the manner in which it is stored.

The methods of freezing fish and shellfish are much like those for other meats. The package requirements are similar, as are also the storage requirements.

Preparation for Freezing. All fish intended for freezing should be scaled, dressed, and washed. Large fish are then cut into steaks, or boneless strips known as fillets. Small fish are made ready for cooking in like manner by removing the viscera, head, tail, and fins. All this preparation has been previously described in Chapter XII, Procuring, Cleaning, and Cutting Fish.

For home consumption, packaged fish has two distinct advantages. First, a considerable saving in storage space is realized by scaling and dressing. Second, it is possible to put into one package just the amount of fish required for one family meal.

Frozen fish dry rapidly in freezer storage and must be carefully wrapped in vapor-resistant paper. Fish may also be glazed with ice by being frozen without wrapping and then dipped one or more

times in near-freezing water. This plain water glaze is not permanent. It cracks or evaporates and may need renewal every 4 to 6 weeks. Further protection by wrapping the glazed frozen fish in vapor-resistant paper is recommended.

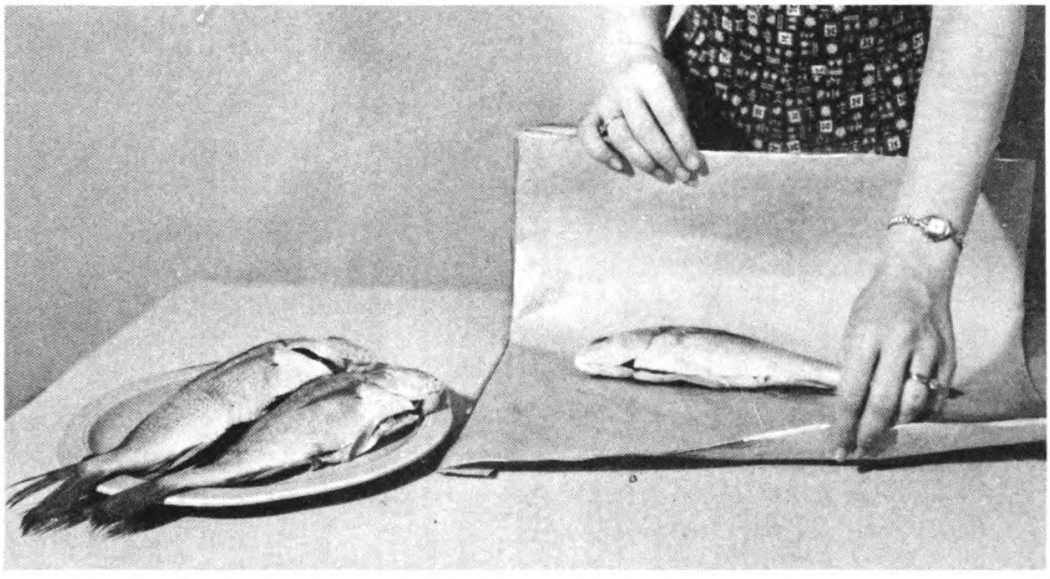


FIG. 174. Small fish may be eviscerated and packaged for freezing.

In some cases it is advisable to give the steaks or fillets a preliminary brine treatment before wrapping and freezing; this pretreatment will reduce drip upon subsequent thawing. It is especially desirable for cuts of non-oily fish, such as cod and flounder. Commercial practice indicates the desirability of a 30-second dip in a salt solution of the following strength: 2½ per cent for croaker, flounder, sole, and mullet; and 5 per cent for barracuda, cod, cusk, haddock, hake, halibut, pollock, rockfish, rosefish, sablefish, and whiting. Two-thirds cup of salt to a gallon of water makes a 5 per cent salt solution, and one-third cup of a 2½ per cent solution. The salt used should be free from impurities which would adversely affect the quality of the fish. Ordinary table salt may be used, but the pure salt which does not have added potassium or magnesium compounds is preferable.

Glass Containers. Fish can also be packed in glass fruit jars fitted with airtight covers and frozen. These containers are generally available in the home. Steaks, fillets, very small whole or round fish, and shellfish should be carefully packed in the jar to within one and one-half inches of the top for quart jars and one inch of the top for pint jars. Enough 2½ per cent brine should be added to

Comparison of Various Methods of Preparing Fish for Freezer Storage.

Method	Type of fish	Advantages	Disadvantages
Whole fish in the round	Large or very small fish Fish with short storage life	Keeping quality good	Much waste material stored in locker; entire fish must be thawed and consumed at one time
Eviscerated or pan dressed	Small to medium sized fish with short storage life	Keeping quality good. Less waste stored in locker than when whole fish is used	Some waste material stored in locker; entire fish must be thawed and consumed at one time
Chunks	Medium to large sized fish	Fish keeps well. Very little waste is stored in locker	Not adapted to very small fish
Steaks	Medium to large sized fish	Very little waste is stored in locker Flexible in that any amount can be withdrawn at one time	Steaks do not keep as well as larger cuts. Require careful packaging
Fillets	Small to medium sized fish	No waste is stored, all bone removed	Requires special skill in preparing

Recommended Methods of Preparing Fresh-Water Market Fish for Storage in Refrigerated Lockers.

Species	Producing region	Season	Recommended Method
Blue pike	Great Lakes	May & June—November & December	Fillets
Buffalofish	Mississippi River	February to November	Chunks
Carp	Mississippi River, Great Lakes, all coastal streams	All year	Chunks
Lake herring	Great Lakes	November and December	Round or pan-dressed
Lake trout	Great Lakes	All year, principally April, May & November	Chunks
Pickerel (jack)	Great Lakes	March and April	Chunks
Sauger	Great Lakes	September and October	Fillets
Sheepshead	Mississippi River & Great Lakes	April, May and June	Chunks
Smelt	Great Lakes	January, February and March	Round or pan-dressed
Suckers	Mississippi River & Great Lakes	April to October	Fillets
Whitefish	Great Lakes	June, July and August	Chunks
Yellow perch	Great Lakes	April and September	Round or pan-dressed
Yellow pike	Great Lakes	April and May, September and October	Chunks

Species	Producing region	Season	Recommended cut	Percentage of salt in brine dip [1]	Cold storage life in months •	
					Wrapped in moisture-vapor-proof material	With 2½ per cent brine in glass jars
Cod	New England, Mid-Atlantic and Pacific	All year	Fillets	5	9	–
Cusk	New England	All year	Fillets	5	9	–
Flounders and sole	Atlantic and Pacific	All year	Fillets	2½	9	–
Haddock	New England and Mid-Atlantic	All year	Fillets	5	9	–
Hake	New England and Mid-Atlantic	All year	Fillets	5	9	–
Halibut	North Pacific and North Atlantic	April–September	Steaks	5	9	–
Herring, sea	Atlantic and Pacific	All year	Round or dressed	No dip	–	6
Mackerel	New England, Mid-Atlantic and Pacific	June–February	Fillets	No dip	3	6
Mullet	Gulf and South Atlantic	All year	Fillets	2½	6	–
Pollock	New England and Mid-Atlantic	All year	Fillets	5	9	–
Rockfishes	Pacific	All year	Fillets	5	9	–
Rosefish	New England	All year	Fillets	5	9	–
Sea Trout (Squeteague)	Atlantic	April–November	Dressed or fillets	No dip	6–8	–
Sablefish	Pacific	June–November	Chunks or steaks	5	9	–
Salmon:						
Chum (Fall)	North Pacific	October–November	Chunks or steaks	No dip	6	9
King (Chinook)	Pacific	April–September	Chunks or steaks	No dip	6	9
Pink	North Pacific	July–September	Chunks	No dip	–	6
Silver	Pacific	June–October	Chunks or steaks	No dip	6[2]	9
Sockeye	Pacific	July–August	Chunks or steaks	No dip	6	9
Smelt	Atlantic and Pacific	All year	Round	No dip	–	6
Snapper, red	Gulf and South Atlantic	All year	Chunks	No dip	6	–
Striped Bass (Rockfish)	Atlantic	All year	Dressed or fillets	No dip	6–8	–
Whiting	New England and Mid-Atlantic	May–October	Chunks	5	9	–

[1] Immerse 30 seconds in brine of the weight-per cent given. ⅔ cup of table salt to one gallon of water gives a 5 per cent solution. ⅓ cup of table salt to one gallon of water gives a 2½ per cent solution.

[2] Freeze in round or in large chunks, ice glazed and wrapped, or pack in glass jars only. Wrapping only in different type papers has been found unsatisfactory.

[3] Based on method of packing, for average storage temperature of 0°F.

fill the spaces between and around the fish and to just cover the product. Air bubbles should be removed with the aid of a spatula or blunt knife. The lid should be screwed tightly into place on the rubber gasket, assuring an airtight seal. The jars are now ready for freezing and subsequent storage. The ice serves to keep the air away from the fish, and the jar seal prevents the loss of moisture from the contents. Jars require considerable space in storage as compared to other packaging methods and they are easily broken at low temperature. However, some new types of jars are designed for frozen food packaging. They are stronger and more efficiently shaped for storage.

The following table was prepared by the U. S. Fish and Wildlife Service to compare the protective qualities of various materials used in packaging frozen fish.

COMPARISON OF PROTECTIVE QUALITIES OF VARIOUS MATERIALS.

Protection	Method of preparation	Advantages	Disadvantages
1. Ice glaze	Round, dressed or drawn fish. Chunks.	Only satisfactory method for fish in the round	Reglazing is required at intervals
2. Moisture-vapor proof paper [1].	Chunks, steaks, fillets and very small fish	Ease of handling	Not adequate for fish which have a short storage life
3. Glass jars	Steaks, fillets and very small fish	Maximum protection	Color may leach

[1] Moisture-vapor proof paper may be used to wrap glazed chunks for protection against evaporation of the glaze.

No one material is suitable for all cuts of fish; however, glazed chunks wrapped in moisture-vapor-proof paper are protected nearly as well as the cuts packaged in jars. In general, glazing is a good form of protection, wrapping in moisture-vapor-proof paper a better one, and packaging in glass jars in 2½ per cent brine gives maximum protection.

All packages and jars of fish should be plainly labeled and inventoried. Glass and cellophane surfaces, provided they are clean and dry, can be readily marked with a wax pencil (glass-marking pencil). Sometimes it is advantageous to use thin cardboard labels. These are attached to the packages with a cellulose fiber tape. The label should indicate the species of fish, the way it was dressed, the number of pieces, and the date of freezing. For example: silver salmon, 4 steaks, frozen November 15, 1952.

Shellfish. Freezing shellfish presents quite a different problem from that of fin fish, because more preparation is required before they can be frozen. Some shellfish are available for only short periods of the year, and therefore it may be especially advantageous to freeze them for later home use.

Oysters, scallops, and clams can be successfully frozen. To open the shell satisfactorily requires considerable experience, so an inexperienced person will do better to obtain the shucked products, which are readily available in season. Prior to shucking all bivalves should be washed in clean water to eliminate sand. Oysters and clams are opened by inserting a slender bladed knife between the shells so as to sever the abductor muscle from the shell. The bill of the shell may have to be hammered off to permit inserting the knife. When shucking scallops only the abductor muscle or "eye," as it is called, is utilized.

METHODS OF PREPARING SHELLFISH[1] FOR FREEZER STORAGE

Name	Producing area	Season	Suggested method of preparing		
			Shucked, headed, or dressed	Cooked in shell	Cooked meat
Abalone	Pacific	March to Jan.	x	–	–
Clams	Atlantic & Pacific	All year	x	–	–
Crabs	Atlantic & Pacific	All year	–	x	x
Lobsters	Atlantic	All year	x	x	–
Mussels	Atlantic	March to June	x	–	–
Oysters	Atlantic, Gulf, and Pacific	Sept. to April	x	–	–
Scallops	Atlantic	All year	x	–	–
Shrimp	Atlantic, Gulf, and Pacific	All year	x	x	x
Spiny lobsters	Atlantic & Pacific	All year	x	x	–

[1] Clams, crabs, lobsters, mussels, oysters, and spiny lobsters, when purchased in the shells, should be alive, unless cooked.

To eliminate sand, the raw shellfish meats may be washed under a spray of clean, cold water or in a 2½ per cent brine solution. After draining, they are packed in glass jars and covered with 2½ per cent brine solution before sealing, as described previously for fin fish.

To prepare shrimp for freezing, the head and appendages are broken off but the shell is not removed from the tail or edible por-

tion. The tails are then washed and packed in glass jars with a 2½ per cent brine.

Live crabs and lobsters should be cooked for 10 to 20 minutes in boiling 2½ to 5 per cent salt brine. When cool, the shell, gills, and viscera of the crab are removed and the body meat taken out with a pointed knife. The meat from the claws of crabs and lobsters may be removed by cracking the claws with a small wooden mallet or nut cracker, then shaking or picking out the meat. In addition to the claws, the tail of the lobster contains edible meat. It may be removed with a fork; it is then split lengthwise to remove the intestinal tract. Crab meat and lobster meat should be packed in jars with 2½ per cent brine.

Frozen shellfish should be used within a period of three or four months; however, a storage life of six months may be attained where storage accommodations are especially good and the temperature is as low as 10°F.

Labeling. Label each package. Include kind and cut of meat, weight, and date of freezing. If you store the meat in a commercial locker plant instead of a home freezer, be sure to add your name and address to the label. Special stamps, inks, and pencils are made for labeling packages of frozen food. Ordinary lead pencils will not be effective unless the writing is done on strips of cold-storage tape stuck on the waxed coverings. Tags can be tied on, and wrapping paper or tape of different colors can be used to identify various products of different dates of storage.

Storage in the Home Freezer

The life of frozen meats depends upon proper storage conditions. Mistakes in selecting, preparing, wrapping, and freezing meats are less serious if the home-freezer temperature, humidity, and air movement are right. Follow the directions that came with your freezer.

Set the temperature at 15°F. or lower if possible. A temperature of 0°F. is recommended. The temperature always rises when unfrozen meat is placed in the freezer area. Usually 24 to 48 hours are required for satisfactory freezing in the home freezer. Beef can be held with reasonable safety for some time at 5° or 10°, or even 12° to 15°. Of course, as the temperature of storage becomes higher, the time frozen meats can be held satisfactorily becomes less. Pork, poultry, and fish need zero storage if they are to retain their fresh quality beyond a few months. Temperatures below zero are even better than zero but are not necessary and are rarely practical because of excessive operating cost.

Time Limit on Storage. Thawed meats are an easy prey to spoilage. They must be used or cooked promptly after thawing. Even those that are frozen solidly will not keep fresh and well flavored indefinitely. There will be some changes in flavor, texture, and appearance of the meat during the storage period. They should not be objectionable, however, unless the meats are stored a longer time than is recommended. If you follow the normal storage periods for meats, poultry, and fish recommended by the U. S. Department of Agriculture in the following table, your meats will be at their best.

Product	Normal storage period (months)
Sausage and other ground meat	1–3
Fresh pork, Fish	3–6
Lamb, Veal	6–9
Beef, Poultry, Eggs, Dairy products	6–12
Fruits, Vegetables	12 or more

THAWING

The best place to thaw frozen meat is in the home refrigerator. Thawing is so slow at these 45° to 50°F. temperatures that some of the drip is reabsorbed. In addition, the meat remains cold so that spoilage bacteria grow slowly on the wet, thawed surface. Frozen meats handled in this manner will keep for a day or longer. Allow 3 to 5 hours per pound to thaw meat in the home refrigerator, 2 to 2½ hours at room temperature, or about half that time in front of an electric fan.

Thawing in the open air or by immersion of a sealed package in 90° to 100°F. running water is satisfactory for meats that are to be used at once. In any case, thaw the product in its original package to exclude air and prevent discoloration.

All frozen meat removed from the home freezer for curing must be thawed before applying any cure. Meat for curing should be taken from the freezer one day before it is to be cured. Leave it in

the wrapper at room temperature until it shows signs of thawing. Then remove wrapper and place it in the refrigerator or any cool place where the temperature is not lower than 38° and not higher than 50°. Twelve hours or overnight allows enough time to thaw the average-sized piece of meat.

Cooking Frozen Meat

All frozen meat cooks more quickly and uniformly if it is thawed or at least partly thawed. However, it may be thawed before it is cooked or during cooking. Meat that is thawed at air temperatures should be cooked promptly, as the warm, wet, outer surface is an ideal place for spoilage to start. If the meat is thawed first, the cooking time is about the same as for fresh meat. Cooking frozen meat without preliminary thawing requires a much longer time than is necessary for fresh meat or for thawed frozen meat.

When steaks or chops are pan-broiled, they are usually thawed before cooking. Thawed steaks and chops are broiled by the same methods and for the same lengths of time as those which have not been frozen.

The Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, recommends the following time for cooking frozen meats.

Time Required for Roasting Frozen and Thawed Beef to Three Degrees of Doneness at an Oven Temperature of 300° to 350°F.[1]

Minutes per Pound (Approx.)

Degrees of doneness	Standing rib		Rolled rib	
	Thawed	Frozen	Thawed	Frozen
Rare	18	43	28	53
Medium	22	47	32	57
Well done	30	55	40	65

[1] Data from the Minn. Univ. Agr. Expt. Sta. Spec. Bul. 189.

Time Required for Broiling Frozen and Thawed Porterhouse Steaks Rare to Medium Done

Minutes per Pound (Approx.)

Size	Thawed	Frozen
1 inch thick	8–10	21–33
1½ inches thick	10–15	23–38
2 inches thick	20–30	33–43

Frozen-Food Locker Plants

Renting cold-storage lockers to individuals for the preservation of their fresh meats, poultry, fish, fruits, and vegetables has expanded rapidly in many parts of the United States. Dr. E. V. Wilcox, agricultural writer and investigator, tells us that refrigerated storage was first started in Chico, California, by the local ice company in 1903. "The service," he says, "was first offered to merchants for the storage of eggs and apples, but was soon extended to farmers for the storage of meats, and individual wood lockers came into use in 1913. Somewhat later an ice plant manager in Centralia, Washington, offered refrigeration facilities to hunters for the storage of game and to farmers for the storage of home butchered meat supplies."

This convenience in handling home-food requirements became so popular that the movement spread rapidly throughout the Far West and extended eastward. The latest report indicates that there are at present more than eleven-thousand plants in the United States.

The June 1952 count of locker plants by states, reported by the United States Department of Agriculture is as follows:

Alabama	84	Nevada	13
Arizona	32	New Hampshire	27
Arkansas	102	New Jersey	50
California	505	New Mexico	49
Colorado	221	New York	225
Connecticut	59	North Carolina	100
Delaware	11	North Dakota	294
Florida	78	Ohio	466
Georgia	146	Oklahoma	300
Idaho	200	Oregon	504
Illinois	581	Pennsylvania	296
Indiana	349	Rhode Island	8
Iowa	858	South Carolina	75
Kansas	515	South Dakota	300
Kentucky	110	Tennessee	114
Louisiana	42	Texas	546
Maryland	21	Utah	100
Massachussets	43	Vermont	50
Michigan	361	Virginia	77
Minnesota	701	Washington	694
Mississippi	70	West Virginia	25
Missouri	477	Wisconsin	651
Montana	223	Wyoming	79
Nebraska	520		

FIG. 175. Cold-storage locker plants employ butchers to cut, package, and place the meat in the quick freeze unit. Here it freezes within 6 to 8 hours.

The purpose of these plants is to provide freezer-storage space to individuals for the storage of food products and to provide precooling and processing service for meats farm killed. These plants are owned by individuals, partnerships, cooperatives, butchers, ice plants, creameries, cheese factories, and corporations. Complete butchering and curing service for meats is provided at many of the locker plants, the total cost of such service, including annual rental for the locker, being so many cents per pound of meat.

Prospective patrons will have to weigh the advantages and disadvantages of such service when compared with the purchase of meat at retail, butchering and processing, and refrigeration available in the home. Your county agent can give you the names and addresses of frozen-food locker plants in your locality (Appendix F).

CURING MEATS

The term "curing" as applied to meats is sometimes interpreted as referring to both curing and subsequent smoking, but in the text which follows, the word "curing" applies only to dry salt, brine sub-

mersion, corning, or pickling (vinegar cured). Preserving meats by drying, smoking and canning are treated separately.

Meat curing has a twofold aim—first to preserve the meat for future use; and second, to give it added, desirable flavor. Curing meat includes the application of dry salts, brine, or pickle, which in the wider sense applies to any saline or acid preservative solution with some modifications.

Curing is a race between the production of spoilage bacteria in curing meats and the penetration of the preserving salts. It requires weeks for the salts, brine, or pickle to reach sufficient concentration to protect the center of hams, shoulders, and other large chunks of meat. Low temperatures are the best means known today to prevent the growth of spoilage organisms in meat until the salts have completed the tasks assigned to them.

Therefore, the success of curing depends on rapid distribution of the curing ingredients before the putrefactive bacteria begin to grow. This may be accomplished either by the dry-salt or sweet-pickle method, with or without stitch pumping or artery pumping.

The essential ingredient then is salt. It draws moisture from the muscle cells and at the same time enters the cells by osmosis. In this way the salt is finally distributed through the tissue. Salt also checks the action of certain harmful bacteria and inhibits several types of enzymes. If too little salt is applied to the meat, the bacteria that can grow in the presence of some salt will not be checked and spoilage follows. The amount of salt applied may not be the deciding factor, because complete distribution throughout the meat is essential.

Sugar is used mainly to lessen the hardness of the straight salt cure and to improve the flavor and texture of the meat. It also provides a suitable medium for the growth of the bacteria that are necessary to break down the sugar into organic acids. One of these is lactic acid which gives a pleasant flavor to meat. Sugar also helps to fix color. Sugars commonly used in meat curing are cane, beet, and corn.

Honey is often added to curing mixtures to give lean meat a distinctive flavor. It can be used without sugar or to replace the sugar. It is used in the same proportion as sugar.

Saltpeter is also an important ingredient of the curing mixture. It has two functions—fixing color and checking the growth of certain bacteria. Meat owes its red color to hemoglobin, an unstable pigment which, say the meat specialists of the U. S. Department of Agriculture, oxidizes to brown methemoglobin and combines with nitric oxide to form red nitrosohemoglobin. Nitric oxide is formed

through the reduction of nitrate to nitrite. Certain bacteria which occur normally on fresh meat are responsible for bringing about this reaction. A combination of nitrite and nitrate in the ratio of 1 to 10 makes a superior product. Saltpeter (nitrate of potassium) preserves and dries the meat but it is used almost entirely because it effectively fixes the bright-red color of the lean meat. Nitrate of soda (Chile saltpeter) is a little stronger, and 1.7 ounces of nitrate of soda will replace 2 ounces of saltpeter. The exact quantity of saltpeter or nitrate of soda to be used should be weighed and mixed thoroughly in the curing mixture. It is undesirable and quite unnecessary to use more of either saltpeter or nitrate of soda than the amount recommended.

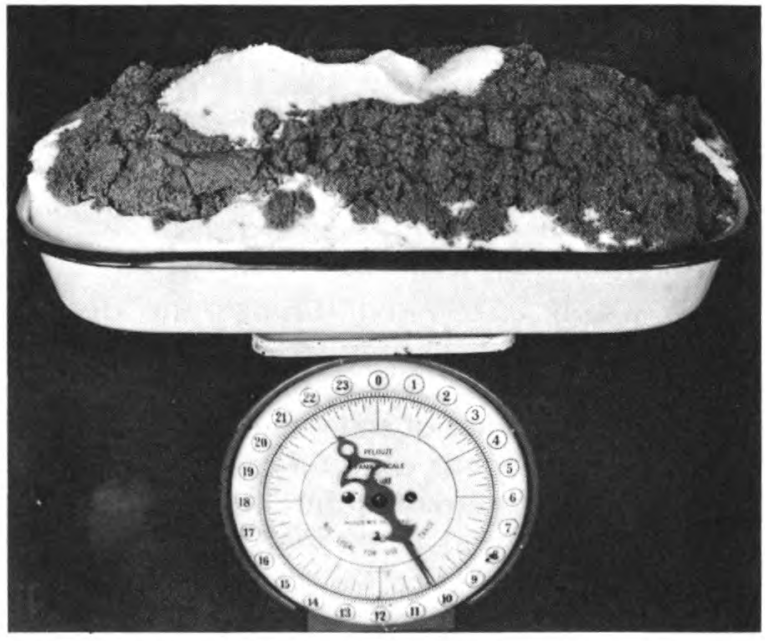


FIG. 176. Be sure to weigh meat and curing ingredients carefully. Too little salt may cause spoilage; too much salt makes hard, dry, over-salty meat.

Various condiments, mainly spices and some herbs, can be added to the curing mixture to give added aroma and flavor. They do not interfere with the regular curing ingredients and may be added to suit individual tastes.

Most persons prefer the sugar cure to the plain salt cure. It can be applied either by the dry or brine method. The dry method is faster, so it is used almost exclusively in the South for hams and shoulders. Both methods are used for all cuts in colder climates. The brine method will produce a milder bacon than the ordinary dry cure.

Pork

The standard curing mixture for each 100 pounds of meat is 8 pounds of salt, 2 pounds of sugar, 2 ounces of saltpeter, and 4½ to 6 gallons of water.

Weigh the meat and put the measured or weighed water (8 pounds = 1 gallon) into a crock or clean, well-soaked, odorless, hardwood barrel. Pour the curing ingredients into the water and stir until they dissolve. The water used for making the brine should be perfectly pure. In order to be sure that the water is pure, it is always advisable to boil and cool it before using it to make the brine.

Brine Curing Pork. If a salinometer is available, use a little less water to dissolve the salt than recommended. Then place the salinometer in this strong brine and dilute it to proper strength. The standard curing mixture dissolved in 4½ gallons of water will make a brine that tests about 75° on the salinometer (sal). This is excellent for curing hams and shoulders. When 5½ gallons of water is used, the weaker brine, testing 650 sal, will produce a desirable mild bacon.

If the brine is sterilized by boiling, it should be thoroughly cooled before being used. Under ideal conditions both the brine and meat will be at a temperature of about 38°F. when the meat is put down.

Pack the hams and shoulders skin side down in the container. Fit them closely together but do not squeeze them out of shape. Pour in the cold 75° sal brine until the pack begins to shift or float a little. This movement permits the brine to come in contact with all surfaces of the meat. Then place a clean weight on the meat just heavy enough to keep the meat below the surface. Then cover the pack with brine.

The shape of the curing vessel or the loose packing of the meat may cause the estimated quantity of brine to be insufficient to cover the meat. If the meat cannot be packed more closely, add enough more brine to cover the pack.

On the fifth, fifteenth, and thirtieth days after being put into the brine, the hams and shoulders should be overhauled; that is, they may be packed in another container, and re-covered with the same brine, or the meat and the brine may be removed and repacked in the same vessel. This overhauling re-mixes the brine and insures its contact with all surfaces of each piece of meat.

The bacon sides are usually packed flat, skin side down, each strip being crosswise of the one below it. Jowls or shoulder butts may be used to fill any unoccupied spaces. The milder 65° sal brine is

FIG. 177. Fit the cold, smoothly trimmed cuts into a clean barrel or crock. Cover with a cold brine (36° to 40° F.) until the pack begins to shift or float.

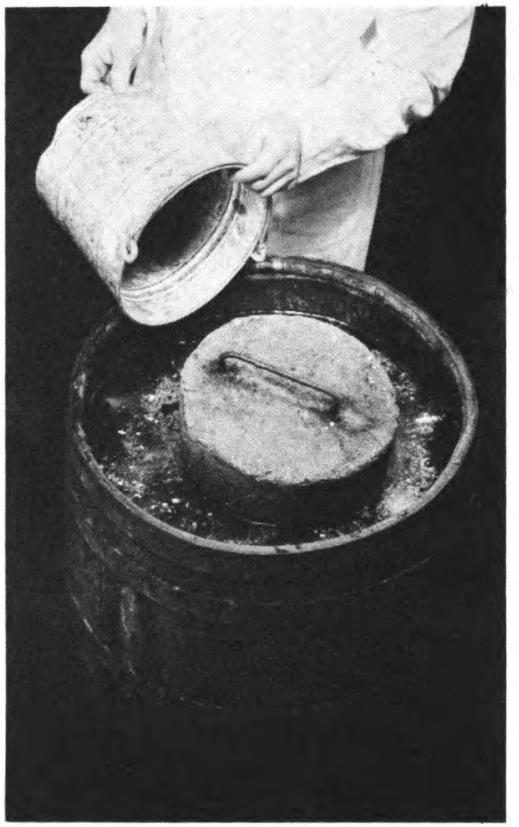


FIG. 178. Weight the meat to keep it from floating above the brine. Use enough cold brine to submerge the meat.

FIG. 179. The weight should be heavy enough to hold the meat below the brine. After the meat has been in the brine for about five days overhaul it.

frequently used for bacon. Overhauling this meat on the third and tenth days is usually sufficient.

The purpose of overhauling brine-cured meats is to shift the position of the pieces and get the brine cure re-mixed while the meat is curing. The brine should be stirred up or poured out of the container and then poured back. This will make a uniform density throughout.

Curing Time for Brine Method. Hams and shoulders are usually kept in brine 4 days per pound; that is, a 15-pound ham will not be removed from cure until the sixtieth day. It is probably better to allow the small 4- to 6-pound picnic hams 25 to 30 days in cure. Bacon can be cured in 1½ to 2 days per pound.

A thin scum of white mold normally forms on top of the brine. This generally takes place when the weather turns mild, causing the brine to become ropy. If the mold becomes heavy and hard or if the brine becomes ropy so that it drips from the fingers like sirup, the brine should be changed. Remove the meat, scrub it thoroughly with a brush and warm water, and repack it in a clean, scalded container. The new brine, made following the original recipe, should be diluted to as nearly the saltiness of the old brine as possible. If the hams and shoulders have been in cure a week, use 70° brine instead of 75°; if more than 2 weeks, use 65° brine. Maintain the original curing schedule. This process may not save the meat but it is the only course available.

Often the quantity of loin, spareribs, backbone, and other fresh cuts at butchering time is greater than the family can use promptly and economically. These cuts can be preserved by curing as well as by freezing and by canning.

A mild 55° to 65° brine, which contains about 6 gallons of water, is best for spareribs. They can be smoked after a week in cure or used without smoking. The loin may be given a light smoke after about 3 weeks in a 65° brine or may be used without being smoked.

Because of the area of lean meat exposed, these cuts are likely to become dry and harsh if given a long cure or smoke. It may be more satisfactory to allow them to remain in the brine if the meat is to be used in a short time. Keep the temperature of this meat as near 38°F. as possible while it is curing.

Dry-Salt Curing Pork. In dry-salt curing of meats, the curing mixture is rubbed directly on the meat. This method is generally more satisfactory than others when the curing temperature cannot be kept at 30°F. Meat so processed is allowed to remain in cure approximately 2 days for each pound.

There are many different formulas for dry-curing hams and shoulders that call for various quantities of salt. Five pounds for each 100 pounds of meat is generally sufficient if one is sure that all the salt will be absorbed by the meat. However, since some salt ordinarily falls off or drains away, 6 to 8 pounds is a safer quantity. In the South, where the temperatures are often high, 8 pounds of salt is probably better. More than this quantity should not be used as it may injure the flavor and dry out the lean meat, making it too hard.

Meat may spoil, regardless of the quantity of salt applied, if the freshly slaughtered carcass and the meat to be cured are held at too high temperatures.

For each 100 pounds of trimmed pork use 6 to 8 pounds of salt, 1½ to 2 pounds of sugar, and 2 ounces of saltpeter. This is the well known 8–2–2 formula which is used for both the dry and the brine cure. This same curing mixture with the salt reduced to 5 pounds will dry cure 100 pounds of bacon.

Mix the ingredients thoroughly in a pan and divide into two equal parts by weight. Use one part for the first rubbing and half of the remainder for overhauling the meat on the third day, and the other half for overhauling on the tenth day. The meat can be packed in a barrel or a box with a few holes in the bottom to let the bloody water drain out. Keep the container with the meat in it free of the ground or floor, a few inches up, so the liquid can drain out. Before the pack is started, sprinkle a little of the mixture over the bottom of the container.

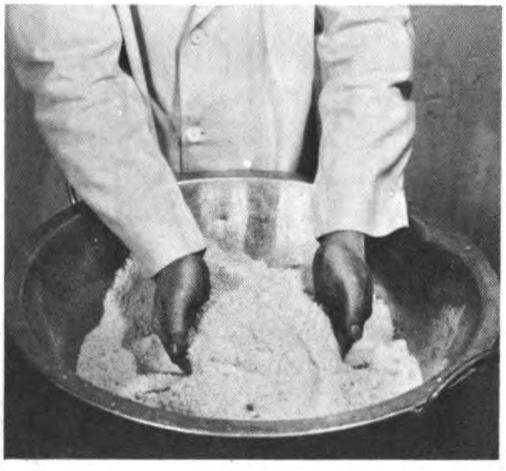


FIG. 180. Dry-cure. Weigh and mix ingredients thoroughly, being especially careful to mix the finely powdered saltpeter through the salt.

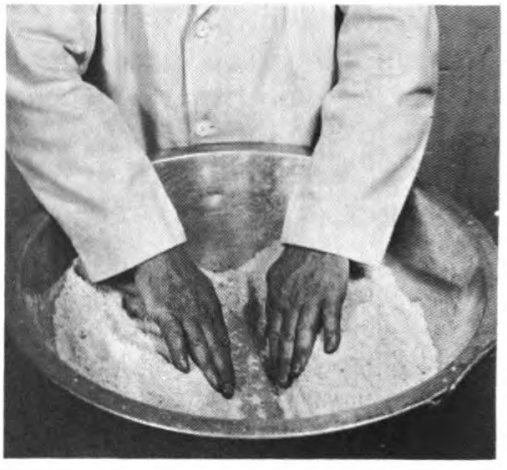


FIG. 181. Divide the curing mixture into two approximately equal portions, one portion to use at once, the other for later resalting.

In applying the curing mixture one must take precaution to use the proportionate amount to each piece. The dry-cure ingredients are mixed in the proportion of 8–2–2 and the total is 10 pounds. One-half of this amount, or 5 pounds, is to be applied to 100 pounds of meat when it is first put in cure. For example, each 15-pound ham should receive the application of 15 per cent of the 5 pounds of mixture or three-fourths of a pound; each 20-pound ham, 1 pound. Bacon strips, because of their large surface in proportion to weight, are frequently over salted. It will require some practice to determine properly the amount of mixture required by each piece.

Put each ham and shoulder into the pan of curing mixture and rub the meat thoroughly with the mixture. A slow circular motion in applying the mixture on both flesh and skin sides will prove most efficacious. Force some curing mixture into the hock and along the cut face of the butt, taking care not to injure the hand on the butt bone in the process. Cover the face of the cut with the mixture and pack the pieces carefully in place. The heavier pieces should be at the bottom and the lighter ones on top. Do not pack the meat more than 3 feet deep. Repeat the process in overhauling. The pieces at the top of the original pack should be at the bottom when the meat is resalted.

In mild weather, cover the box with a clean cloth to prevent flies and other insects from getting at the meat. In very cold weather, the meat should be covered or otherwise protected against freezing.

FIG. 182. Rub one portion of the curing mixture on all surfaces of meat, poking some into shank ends.

Meat that is allowed to freeze before or after it is put into cure will never produce a fine product.

If a very mild cure is desired, do not give the second application to bacon or other small pieces of pork. Also if the meat is to be used shortly after it is cured, the total amount of the dry-cure mixture used per 100 pounds of meat can be reduced. When meat is to be kept for longer periods, from one curing season to the next, it is necessary to give the meat a heavier cure.

Curing Time for Dry-Salt Method. The meat should remain in cure about 2 days per pound for hams and shoulders and about 1½ days per pound for smaller pieces. For example, a 10-pound ham should cure 20 days; a 20-pound ham 40 days; a 10-pound side of bacon 15 days. Different sized pieces should cure in proportion to their weight. Farmers who wish to store this meat for summer use often remove the pieces of meat at full time, string them, and allow them to hang for about 2 weeks before smoking them.

Weather conditions influence the length of time meat should cure for the best results. A longer time is required for meat to cure in very cold weather than in milder weather. Much home-cured meat has become oversalted by being left in the cure too long. On the other hand, if meat is taken out of the cure too soon and the weather remains cold, the meat may be only partially cured because it will not take the cure when the temperature of the meat goes below 34°F.

Pumping concentrated brine into curing meat, poking salt into ham joints, removing the aitchbone, opening the stifle joints and the shoulder joint or boning and slicing entire cuts are all variations of an effort to speed up the penetration of the salt. Where the proper temperatures are available and the meat is in good condition, these methods are unnecessary. Where temperatures are too high or the meat is not in good, sound condition, these methods may or may not prevent spoilage.

Scientifically prepared curing salts with smoke flavor and spices ready for use in the dry curing and the brine or sweet pickle curing of meats can be purchased at the grocery store. They consist of an accurately proportioned, carefully combined blend of high-grade meat salt with balanced sugar-curing ingredients. The condensed wood smoke ingredient imparts the curative and flavoring properties of smoke to the meat while it is curing. This method of curing and flavoring at the same time saves extra work and adds delicious flavor.

The Morton method recommends pumping pickle into hams and other large pieces of meat along the bones and at the joints. This

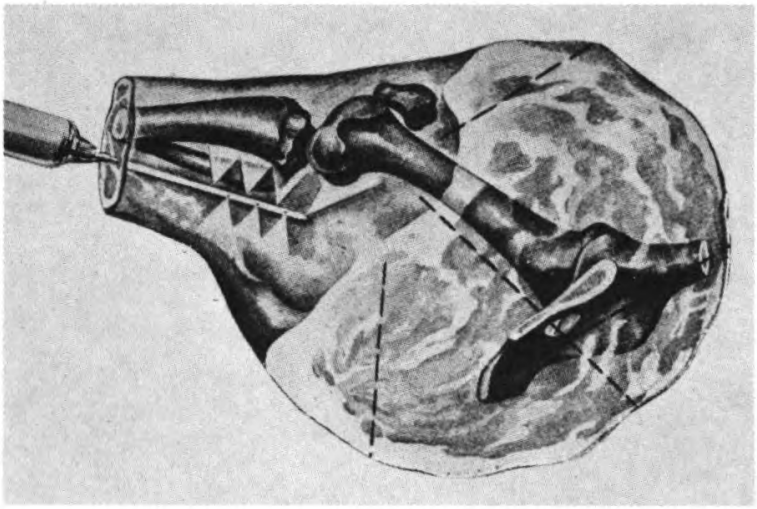


FIG. 183. Brine may be pumped into hams and other large pieces along the bones and at the joints.

starts the cure right next to the bone, offsetting the chance of bone taint, and gives a mild, thorough cure in the center of the meat. After the pickle is pumped into the meat, the dry or sugar-cure is rubbed on the outside of the meat in the regular manner.[1]

Smithfield Processed Ham. An especially cured ham is prepared in Virginia and other South Atlantic States and has a countrywide reputation as the Smithfield ham. Its distinctive aroma and flavor are supposed to come from fattening the hogs on peanuts. However, large numbers of fresh hams are shipped from the Middle West to points in Virginia where they are given the Smithfield cure. Hogs produced in the corn-belt states are not fed peanuts, so the distinctive taste of the Smithfield ham undoubtedly is the result of special processing rather than the feeding of peanuts.

These hams are cut with the long shank attached. They are cured in a dry mixture for 5 to 7 days, depending on their weight. They are then overhauled, resalted, and held in cure from 25 to 30 days (1½ days per pound). After this dry cure is completed the hams are washed in warm water, dried, sprinkled with pepper, and cold smoked (70°–90°F.) for 10 to 15 days, after which they are aged and mellowed by hanging in a dry room. These hams improve with age and are in perfect condition when 1 year old.

Box-Cured Bacon. The box cure has been developed to produce mild, fancy breakfast bacon with an appetizing flavor. The Morton Salt Company has developed a special sugar cure and a box for

[1] *Home Curing Made Easy*, published by Morton Salt Company, of Chicago, Ill.

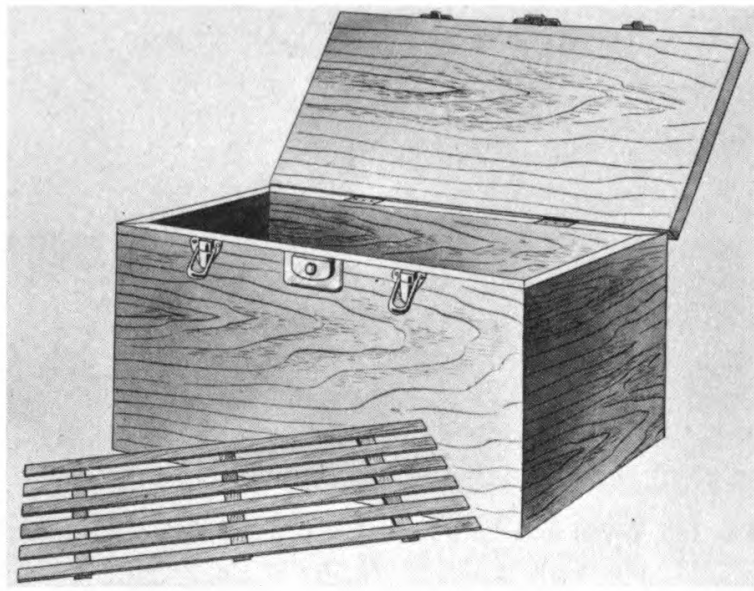


FIG. 184. A strong watertight container with suitable cover is required to box cure fancy bacon.

curing fancy breakfast bacon. The box should be made strong and watertight. Hardwood, such as oak or maple, is the best material to use in constructing this box. The length and breadth of the box should be approximately the size of an average bacon strip—10 inches wide and 20 inches long. The depth can be determined by the number of bacon strips to be cured at one time. Ordinarily a box about 24 inches deep will accommodate the bacon sides from 5 or 6 hogs.

The top used to cover the meat in the box should be a slatted gadget of the proper size to fit inside the box. This can be held down by sufficient weight, or a hinged top can be made of the proper dimensions so it will press on the slatted tray against the meat and hold it under pressure while curing. The pressure should be firm but not heavy.

This method is most successful for curing bacon, because the shape of the pieces enables close packing. Select well-streaked, thick bacon sides or bellies and trim the edges and ends square, leaving the strip just large enough to fit flatly inside the box to be used.

The formula for box-curing is 5 pounds of salt, 3 pounds of sugar, and 3 ounces of saltpeter per 100 pounds of meat. Mix the ingredients well and then take a handful of the mixture and scatter it evenly over the bottom of the box. Now pack a layer of bacon sides just as closely as possible in the container. Tamp each belly as it is packed with a wooden block in order to flatten it out and remove

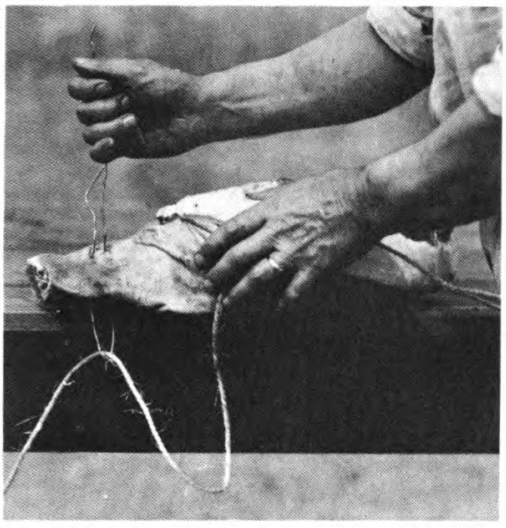


FIG. 185. Stringing a cured ham for smoking. Hams and shoulders through shank; bacon, reinforce flank end with hardwood skewer or clean galvanized wire to hold it square in smoke.

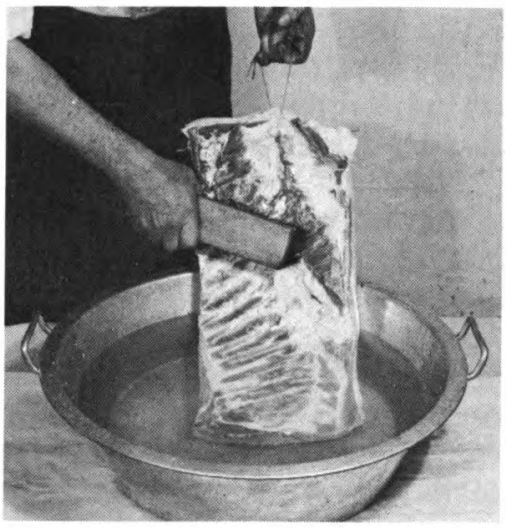


FIG. 186. Scrub strung meat with stiff brush and hot (110° to 125° F.) water so it will take brighter color in smoke.

any air pockets underneath. Distribute more of the curing mixture evenly over the top of the meat and then pack another layer of meat and continue this operation until the box is full.

Do not fail to sprinkle the top layer of meat with a portion of the cure mixture when it is packed. In a few days a curing pickle will be formed through the action of the curing ingredients on the juices of the meat. In a short time there will be enough brine to cover the entire pack. The time for curing is the same as for the other methods of curing described previously.

Repacking or overhauling is necessary in from 7 to 10 days after the start of the cure. At this time any leftover portion of the original dry-cure mixture should be rubbed on the meat, and the top and bottom pieces should be reversed when they are repacked.

CORNING BEEF

Corning, which means curing with brine, is used to preserve the cheaper cuts of beef for future use. The foremost products of beef processed in this manner are corned beef and dried or chipped beef.

In preparing corned beef, the plate, rump, and chuck are generally used. Meat from fat animals makes better corned beef than that from thinner ones.

Cut the beef into pieces, 5 or 6 inches square. They should be of uniform thickness so they may be packed in even layers in the curing container. Just as soon as the beef is chilled it should be corned. Never put frozen meat into cure.

Weigh all the pieces of beef, and for each 100 pounds allow 8 pounds of salt. Sprinkle a layer of salt about one-quarter inch deep over the bottom of the vessel (a stone jar or wooden barrel which has been thoroughly cleaned); pack the cuts of beef as closely as possible making a layer 5 or 6 inches thick; then add alternate layers of salt and meat, being careful to cover the top layer of meat with considerable salt.

Allow the salted meat to remain overnight; then add a solution composed of ingredients in the following proportion: For 100 pounds of meat, use 4 pounds of sugar, 2 ounces of baking soda, and 4 ounces of saltpeter dissolved in one gallon of lukewarm water. Mix thoroughly and pour over the meat. Then add 3 gallons of water. Keep the meat entirely under the brine by using a board cover with a weight on it. Do not permit any meat to project above the liquid, for this will cause the brine to spoil in a short time.

If the meat has been corned during the winter and must be kept into the summer season, watch the brine closely during spring, for this is the time, more than any other season, that it is likely to spoil. If the brine is ropy, discard it and proceed in the same manner as previously described for pork.

To cure thoroughly, beef should be kept in the brine 28 to 40 days. Meat removed from the brine should be hung up and drained thoroughly before wrapping or smoking.

Curing Tongue

Tongue is one of the most popular meat delicacies. Beef tongue is generally understood when "tongue" is employed as an unqualified expression, but calf, lamb, sheep, and pig tongues also are freely consumed. Beef tongues are used fresh, smoked, sweet pickled, and canned. Lamb tongue is usually pickled. Sheep tongue is generally used for making sausage. Pig tongue is canned.

Tongues can be cured in the same brine as that given for corned beef. The time of curing is:

	Days
Beef tongue	25 to 30
Calf tongue	12 to 14
Pig tongue	10
Lamb tongue	8

After they are cured, washed, and drained they can be given a light smoke or they may be cooked without smoking.

Lamb

Among the peoples of the U.S.S.R. and some of the satellite countries, cured mutton is regarded as quite a delicacy. The neck, shoulder, and ribs are cut into small pieces and then sprinkled with salt, pepper, pieces of garlic, dill, and parsley. The meat is then placed in a stone crock and covered with boiled vinegar allowed to cool, to which has been added an equal quantity of water flavored with tarragon. The meat is allowed to remain in this mixture for several hours to a day. Many eat the cured meat raw without smoking or cooking it.

Lamb or mutton cured in this manner is generally run on long skewers, separating each piece with onions, slices of bacon, and firm tomatoes. They are then exposed to a flame or broiler and the juice is collected. The meat is cooked rare and served on the skewer, generally with rice. The Russians call this Caucasian Shachlik or Shahshlik. In Armenia, lamb or mutton prepared in this manner, with a few national variations, is known as Shish Kebab. Both are delicious when broiled out-of-doors over a low charcoal fire.

Lamb is easily and quickly cured, but there is the disadvantage that the cuts dry rapidly after smoking and tend to become strong in flavor. Legs and shoulders are the parts usually cured, although any portion may be preserved by curing for later use. Ribs, loins, and breasts that have been cured and smoked may become disagreeably dry and strong in flavor after only 3 or 4 weeks in storage. Smoked legs store better than shoulders, but even legs will become fairly dry and hard after 2 to 4 months' storage at room temperature. Some families prefer the "gamey" flavor of cured lamb, and cure several cuts for special use. Freshly smoked lamb may be boned and canned in the pressure cooker by those who wish to prevent the meat from drying.

Either the brine or dry-cure method may be used in curing lamb.

Brine-Curing Lamb. A standard formula, calls for 8 pounds of salt, 2 pounds of white or brown sugar, and two ounces of saltpeter. The mixture, dissolved in cold water to make 6 gallons, produces a mild brine. Pack the meat carefully and closely in a crock or other clean container. Pour in the cold (36° to 38°F.) brine until the pack begins to float and then proceed as previously described for other brine-cured meat.

Six gallons of brine should cover 100 pounds of meat. If 6 gallons is insufficient, more brine should be made and used to submerge the meat.

Overhaul the meat on the third to fifth day. Overhaul, repack, and cover with the brine; repeat at the end of another week. In about 3 weeks the large pieces of meat will be well cured. For best results each piece of meat should remain in the brine 3 days for each pound. Smaller pieces should be removed at the first overhauling; otherwise they will be too salty. Wash the pieces in tepid water after curing and allow them to soak for a half hour and drain. If you desire the smoked flavor, hang in the smokehouse and expose to hardwood smoke.

Dry-Curing Lamb. Make up a mixture of dry ingredients composed of 5 pounds of salt, 4 pounds of sugar, and 4 ounces of saltpeter for each 100 pounds of lamb. Mix the ingredients thoroughly, sprinkle a little on the bottom of the clean container and rub and pat the proportionate amount on each piece of lamb, fitting the pieces carefully into the pack. Apply about two-thirds of the mixture the first time, the remaining third being used when the meat is overhauled 3 to 5 days later. The meat may be left in cure until used or may be removed for smoking.

Curing Game Meats

Very little experimentation has been done to determine the best methods for curing and smoking game meats. In some localities where game laws permit possession of the meat after the close of the hunting season, curing and smoking of venison has been carried on. The methods followed, however, have been chiefly those commonly used to preserve meat of domestic animals.[1]

Recent attempts to find methods for preserving any surplus game have undoubtedly contributed to the recent interest in smoked game. Popular articles on the smoking of game have appeared in sporting periodicals, the press, and a few cookbooks, but these accounts give only general information as to methods and techniques. Therefore, until some expansive data based on research are available, those who wish to preserve game meat for any appreciable length of time will have to rely on the results obtained in curing and smoking domestic animal meats.

[1] Cured, smoked, and canned game meats are subject to possession limits during closed seasons the same as fresh game. Consult the local game warden for this information (Appendix E).

Venison resembles beef and mutton in texture, color, and general characteristics. Its flavor is distinctive, suggesting beef rather than mutton. The directions given for the curing of beef and lamb may be used in curing venison. Corned and dried venison can be processed in the same manner as that described for beef. Cured and smoked reindeer and bear loins were formerly a delicacy in Russia and were obtainable in the best food shops.

Curing Fowl

Although the curing and smoking of fowl is a recent development in the United States, the Chinese have been preserving ducks in this manner for centuries. Cured smoked turkey is a delicacy that is fast growing in popularity in the United States.

Turkeys, Ducks, and Chickens. The fowl to be used for curing should be well fattened. Care should be taken not to break the skin in the dressing and handling process. Birds with badly torn skin should not be cured. In preparation for curing, the head, neck, shanks, and feet are removed, leaving the body cavity open at both the front and rear ends. The removal of the tendons in the drumstick is suggested to provide for better penetration of the curing ingredients into the meat of that portion of the bird.

Turkeys may be cured by either the brine or dry-salt method. A suitable brine cure mixture consists of 6 pounds of salt, 3 pounds of brown sugar, and two ounces of saltpeter dissolved in 4½ gallons of water. This brine contains approximately 13 per cent of salt and has a salinometer reading of about 70° at a temperature of 38°F. About four times this indicated quantity of brine is required to cover 100 pounds of moderately large, drawn turkeys when packed carefully in a 50-gallon barrel.

Pack the turkeys in a suitable crock or a clean, well-soaked barrel in the same manner as previously described for other meat. Place a clean board and a stone or some other weight to hold the turkeys down when the brine is added. Pour the solution over the turkeys until they are covered with a slight excess of liquid. It is important that the meat and the pickle mixture be approximately 38°F. when the curing process is to begin and it should be kept at that point throughout the curing period. At weekly intervals the turkeys should be removed from the container and repacked in order to remix the brine and to insure that it will come in contact with all parts of the birds.

Experiments conducted by the U. S. Department of Agriculture indicate that dressed turkeys weighing from 14 to 20 pounds should

remain in the curing solution approximately 1¼ days for each pound. After the turkeys are cured they should be removed from the brine and washed in warm water. Loop a stout cord under each wing close to the body, tying the cord in the center of the back. Then hang up the birds to dry. They should hang in this same manner when smoking.

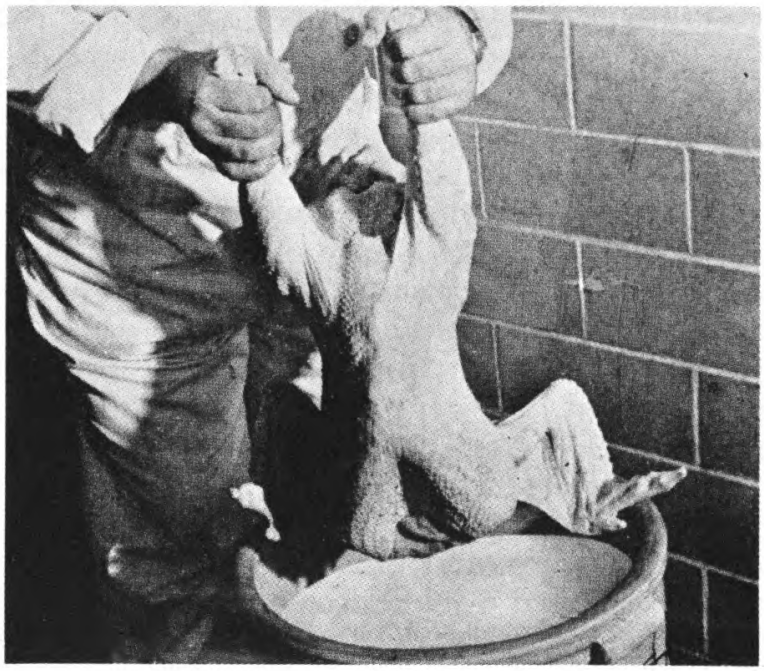


FIG. 187. Placing a turkey in brine. Turkeys, ducks and chickens may be cured either by brine or dry-salt method.

Gourmet Magazine recommends a dry-cure method for curing turkeys. In cutting off the head of the turkey leave the neck as long as possible. Cut the neck skin in a straight line following the backbone. Pull back the neck skin, cut the windpipe, and then proceed to draw the bird. After the turkey has been dressed, bend the skinless neck and stick it into the cavity. Flap the neck skin over the neck opening. Fasten it on the back of the bird with skewers and by bending the wing tips backward. This is necessary to catch the fat that will ooze out during the smoking.

Fill a small piepan with very fine salt and heat it thoroughly in the oven. In a kettle large enough to hold the turkey, bring water to a rapid boil and submerge the turkey. When the water has returned to the boiling point, continue the boiling over a high flame for 5 to 7 minutes, depending on the weight of the turkey—5 minutes is sufficient for a 14-pound turkey. Remove the turkey from

the water, drain it quickly, and, working very rapidly, rub into its skin ½ ounce finely ground saltpeter and as much of the very hot salt as the meat will absorb. Continue to rub salt into the bird until it has cooled to lukewarm, which should take about 15 to 20 minutes. This dry-curing must be done as rapidly as possible to rub in the greatest amount of salt. Dissolve ¼ pound of salt in 1 pint of boiling water, and inject this brine with a needle syringe into the wing and leg joints and along the flat part of the breastbone. Stuff the cavity of the turkey with a large bunch of fresh herbs—tarragon, marjoram, thyme—or any combination of the three. Secure a stout cord loop around the legs, wrap the turkey entirely in cheesecloth, and tie the ends with a cord on the legs. Now the bird is ready for the smoke house. Chickens and ducks can be cured in the same manner as turkey.

Geese. The legs and breast of the goose are the only parts used in curing and smoking goose.

The legs and the breast are cut from the goose and placed in brine. Trim off both sides of the breast and both legs. Place the two pieces of breast together, meat side in, and sew the skin all around. When the breast is completely enclosed fasten the twine at one end as a loop to hang up the meat. Trim smooth both legs and fasten a twine loop to each. Make a brine consisting of 1 pound of salt and ¼ pound granulated sugar dissolved in 2 quarts of boiling water. Leave the meat in the pickle for 3 weeks. Remove, rinse with warm water, and hang up to dry. The goose meat is now ready for the smokehouse.

Pheasants. A good brine cure for pheasant is a solution consisting of 2 pounds of sugar, cured salt, ½ box of allspice, and 1 gallon of water. The birds are dressed similar to a roasting chicken or turkey. They must be completely submerged in the solution for 7 to 10 days. After curing, they are placed in cold water for about 12 hours and then hung up to drain and dry for another 12 hours. They are then smoked.

FISH

Fish may be corned, brine-cured, dry salted, smoked, or pickled. These methods are more advantageous than canning because they are simpler, require little equipment, are less expensive, and permit utilization of fish not canned successfully.

Preservation While Fishing. Sport fishermen, and the casual angler, frequently bring in fish in poor condition. Sometimes the fish must be relegated to the garbage can. This is often the case when the weather is warm and the fisherman is far from home.

Even though refrigeration is not available, such waste is avoidable if the proper procedure is followed. Bleed the fish as soon as caught by pulling out the gills completely, leaving no remnants. Clean the fish as soon as possible, scraping out all traces of blood and intestinal material. Wash the body cavity thoroughly. This delays spoilage; if a thorough cleaning job is not done, the fish will spoil sooner than if it were not cleaned at all.

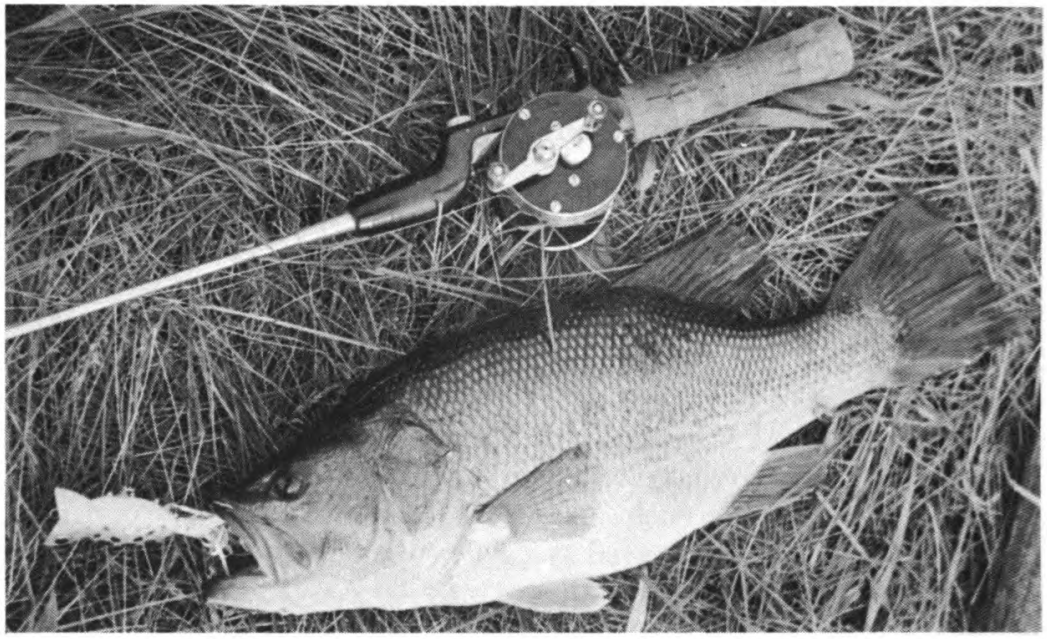


FIG. 188. Do not let fish lie on the grass. Bleed it as soon as caught by pulling out the gills completely. Then follow proper procedure to preserve it while fishing.

To one cup of fine table salt add one tablespoon of pepper. Mix thoroughly and rub the belly cavity well, also the flesh, at the ratio of about one tablespoon to ¾ pound of fish, sprinkling a small amount on the skin side.

Place the fish in a clean basket or box. A loose packing of green leaves around the fish has been found effective in inland regions. Cover the container with several thicknesses of burlap. Do not let the burlap rest on the fish but keep an air space a few inches above them. Keep the cloth well moistened with water, since evaporation of moisture lowers the temperature in the container. Corned in this manner, fish will remain in good condition for at least 24 hours when ice is not available. When rinsed thoroughly in clean, fresh water these fish are ready for cooking in any manner desired. If rolled in salt and packed with as much of it as will cling to them,

the fish will keep for about 10 days. Before they are cooked, be sure to freshen them for about 10 hours in one or two changes of fresh, cold water.

Almost any variety of fish may be cured at home. As a rule, the so-called "lean" species are salted more readily; salt brine does not penetrate as rapidly in "fat" fish.

Fresh-water fishes usually salted are lake trout, whitefish, lake herring, blue pike, yellow pike, catfish, perch, and pickerel. Others that may be salted at home are sheepshead, carp, suckers, buffalo fish, river herring (alewife), eels—in fact, almost any fish of satisfactory size.

Salt-water fishes, commonly salted at home, are cod, hake, cusk, pollock, bluefish, sea trout, channel bass, rock or striped bass, salmon, shad, sea bass, rockfish, mackerel, sea herring, and Florida mullet.

Brine-Curing. Brine-curing fish at home requires stoneware crocks, tight fitting covers, tubs or cut-down barrels, and a few sharp knives. A family curing less than 50 pounds of fish needs only a sharp knife and two 2-gallon stoneware crocks. Stoneware crocks are preferable because there is little danger of leakage, foreign flavors are not absorbed by the container walls, and the crocks may be used later for other purposes.

Use only pure, clean salt of fairly fine grain, "three-quarters" ground or "dairy fine." Finely ground salt is preferable because it forms into brine and penetrates the flesh more rapidly.

The method of curing, in general, is the same for all varieties. Small fish are split down the back so as to lie out flat in one piece with the belly not cut through. Cut just under the backbone and then score the flesh with the point of a knife at intervals about one inch apart. Clean the fish thoroughly so no trace of blood or intestinal contents remain, and remove the gills from the split head.

Large fish are split into fillets and the backbone is removed. The collarbone just below the gills is not cut away. If this is done the fish is damaged in handling and, if it is smoked, the pieces will drop from the hangers in the smokehouse, because the skin and flesh will not hold the weight unless the collarbone is there to give it support. The flesh of the large pieces or filets is scored on the inside longitudinally to a depth about ½ inch at intervals, 1 or 2 inches apart. These cuts should not be so deep that they penetrate the skin side. Cut the pieces long enough to lie flat on the bottom of the container.

Thick-skinned, spiny-finned fish with large scales, such as carp, suckers, buffalo, black bass, channel bass, and catfish, should be

skinned and the fins removed. This is done by making a deep cut along each side of the fin and pulling it by hand from its base.

All fish to be brined are washed thoroughly in fresh water, after which they are soaked for 30 minutes to 1 hour in a brine made in the proportion of ½ cup of salt to 1 gallon of water. This removes the diffused blood from the flesh and cuts away slime from the skin. After brining, the fish are drained for 5 or 10 minutes.

Obtain a shallow wooden box about 2 feet square with sides 6 inches high. Fill it with dry salt. Scatter a thin layer of salt on the bottom of the crock or keg in which the fish are to be salted. Dredge each piece of fish with salt, and rub salt into the places where the flesh is scored. Pick up the fish with as much salt as will cling to it and pack in the container, skin side down. Arrange the pieces so an even layer will result.

With large fish, this is best done if the thick side, usually the one with the backbone, is placed next to the wall of the container. An extra piece may be placed in the middle, if needed. Pieces should overlap each other as little as possible. Scatter a thin layer of salt over the layer of fish, and arrange the next layer of fish in place at right angles to the preceding layer.

Small fish, such as spots, butterfish, and croakers, are packed in a ring with the tip of the head touching the walls of the container. It will be necessary to lay one or two fish across the center to keep the layer level. Stagger successive layers so that each fish rests on two fish of the layer below. Scatter salt between each layer. The top layer of fish, both large and small, should be packed skin side up.

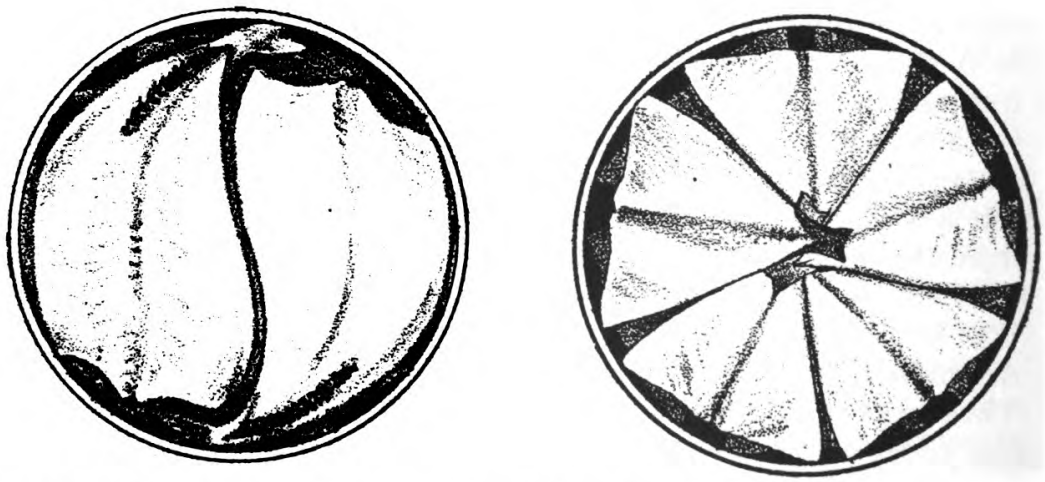


FIG. 189. Methods of packing large fish (*left*) and small fish (*right*) in container for brine-salting.

The amount of salt used, says the U. S. Fish and Wildlife Service, depends on the purity and grain of the salt (less is required, for example, if the salt is of high purity and small grain), the season of the year (more salt is required in warm weather), size and fatness (large, thick, or fat fish require more salt), and probably length of preservation. The proportion of salt used runs from ¼ to ⅓ of the total weight of the fish. A general rule is to use one part salt to three parts fish. In salting, be careful not to exceed the proper proportion—an excess will "burn" the fish, lowering the quality.

Place a loosely fitting wooden cover on the top layer of fish and weight it down. Fair-sized rocks or bricks, previously well washed and scrubbed, make good weights. The fish will make its own brine. Small fish, like spots or croakers, may be "struck through" or completely brine-cured in 48 hours; thicker, larger, fatter fish will require a week or 10 days. At the end of this time, with the exception of a few varieties, the fish are removed, scrubbed in a fresh saturated brine with a stiff bristle brush, then repacked with a very light scattering of salt between layers. Layers must be pressed down. Fill the container with a fresh saturated salt brine and store the container in a cool, dark place. After three months, or at the first sign of fermentation—especially if the weather is warm—change the brine again. Brine-cured fish generally keep longer, but should not be expected to remain in good condition for more than nine months.

Dry-Salting. The dry-salt cure for fish is best adapted for warm climates, but it is also used in northern areas as well. This method is applied successfully to nearly all fish, although fatty fish are more difficult to cure and they keep a shorter time. As a rule, dry-salted fish keep longer than those cured by the brine method.

The home curing of cod, haddock, cusk, hake, and pollock, also to most large nonfatty fish, is given here.

The fish are bled by cutting the throat and pulling out the gills as soon as caught. When the fish reach shore they must be thoroughly washed. The head is cut off, but the "lugs" (hard, bony collar plates) must remain. If not, the fish will separate during curing or afterward in handling. Cut down the left side of the backbone, with the knife edge at a slight downward slant, so that it scrapes the backbone. If the knife blade is held level, much flesh is left on the backbone. Continue the cut down to the tail so that the upper side is removed in one piece. Then insert the edge of the knife blade just below the end of the backbone at a slight upward angle, and cut down to the tail. The fish is now separated into two sides of fillets. If the cutting is well done, the sides are perfectly smooth, with practically no flesh left on the backbone.

Another method, especially adapted to smaller fish (from 2 to 5 pounds) is to cut down the middle of the belly to the vent (anal opening). Lay the fish on the edge of the table so that the head overhangs. Grasp the head and give a quick downward jerk, which removes the head more quickly and easily than by cutting. With the fish lying on its side, cut above the backbone from neck to tail holding the knife horizontal and working from the belly side. This cut must not be too deep. It must not go through the back skin. Next, cut the backbone below the vent (leaving about one-fifth of tail section as a hinge). Cut forward just below the backbone to the head, thus removing it. Make another cut below the remaining section of backbone in the tail section, so that salt may penetrate. The fish should now lie open in one piece.

After the fish is split, scrub the inside of the belly cavity with a piece of coarse sacking to remove the black skin and to clean away blood, membranes, and bits of viscera. Place the fish in a tub of water; wash, and brush thoroughly with a stiff bristle brush. Only pure, fresh drinking water should be used. Brine made in the proportion of 1 cup salt to 1 gallon water is often preferable to plain water. Afterward, drain the fish to remove surplus moisture.

Dredge the fish in a box of salt as in brine-salting. Stack the fish in rows on the floor, choosing a place where the brine formed will run a way to a drain. First, scatter a thin layer of salt on the place where the fish are to be stacked, and arrange them in place by alternating heads and tails. Scatter a little salt between the layers of fish. Fish are piled flesh side up, except for the last layer which is piled skin side up. The average amount of salt used is 1 pound to each 4 pounds of fish.

The fish are taken out of salt after 48 hours to one week, depending upon the size of the fish and the weather. In damp or stormy weather, they are allowed to remain in the salt, as it is useless to attempt drying. Less time is required for salting in warm weather.

When the fish are ready for drying, they should be scrubbed in brine to remove all excess salt and dirt. No traces of salt should be visible on the surface. After draining 15 to 20 minutes, the fish are ready for the drying racks. These are frames of wood covered with chicken wire and standing on legs about 4 feet high. A slat top of thin poles or laths may be substituted for wire mesh, if a 2-inch space is left between laths. The drying racks must be placed on dry ground, preferably covered with gravel.

Oxidation, or rusting of the fish, occurs mostly readily if they are dried in direct sunlight. If the fish are kept shaded in a breezy

location, they will dry well with a clear color. For this reason, drying is best done in the shade under an open-walled shed ventilated by air currents. If only a few fish are being dried, they may be hung under overhanging eaves, or from the rafters of a shed or barn where there is good cross-ventilation.

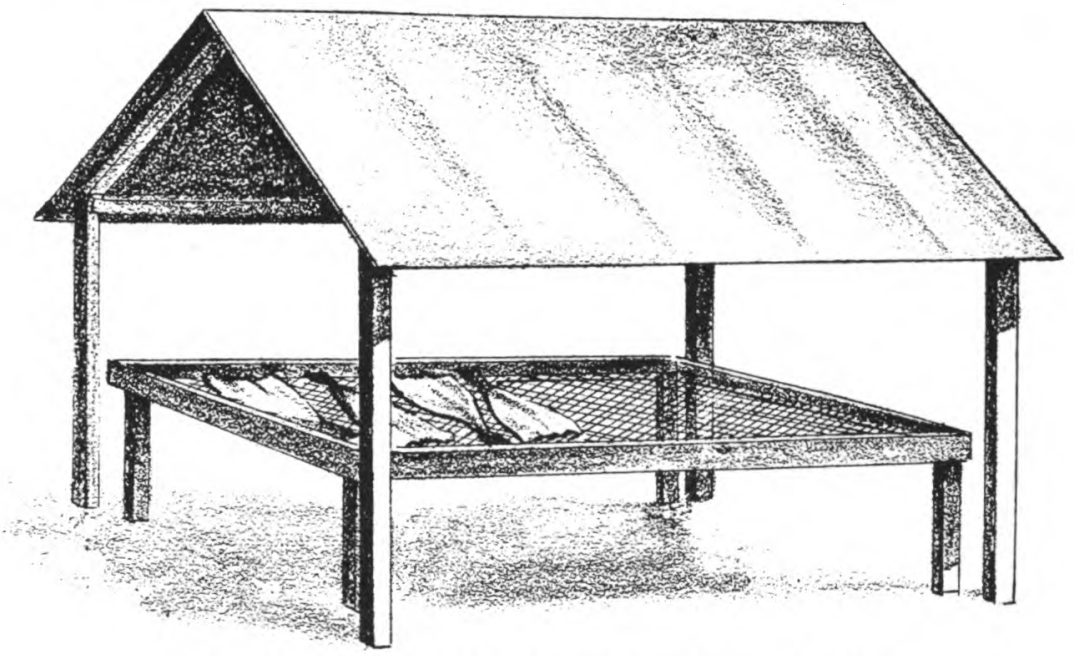


FIG. 190. Drying shed and rack for dry-salting fish.

If placed on racks, the fish are laid skin side down, but should be turned three or four times the first day. They should be gathered up and stored each night, for they sour and mold if left spread out in the open. The fish are stacked in rows, alternating heads and tails, flesh side up except for the top layer. No stack should be more than 2 feet high, and there should be a rack at the bottom to prevent contact with the floor. Each stack is weighted down evenly, the weights at least equaling that of the fish in the

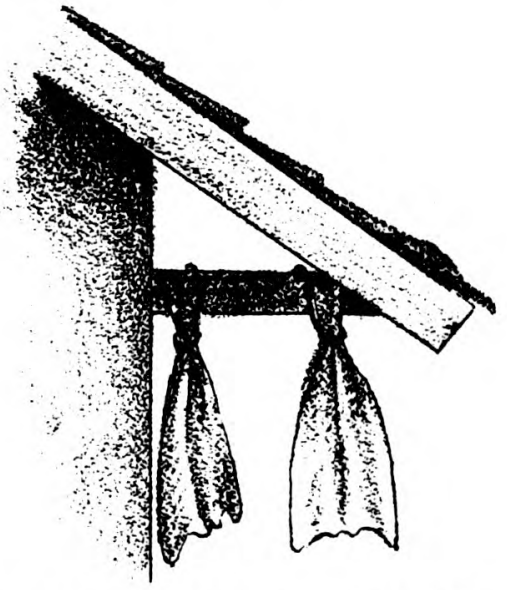


FIG. 191. Drying a few fish under overhanging eves.

stack. Additional moisture is pressed out of the flesh. If the fish cannot be taken out to dry the next day because of unfavorable weather, they must be repiled at the close of the day, placing the top layers of fish at the bottom. If the weather continues to be unfavorable for drying, the fish are left in the stacks, but are repiled every other day with a small amount of fine salt (about 1 pound to 10 pounds of fish) scattered between layers.

FIG. 192. Sheefish drying on racks beside Eskimo home during late summer, Kotzebue, Alaska.

A smoke smudge under the drying racks may be necessary, for the first day at least, to prevent the flies from "blowing' the fish. The smudge should be made of green wood, or a wood fire smothered by green branches. Resinous woods such as pine or fir must not be used. The time required for drying depends upon weather conditions, the size of the fish, and the length of preservation desired. Fairly large cod, haddock, hake, or pollock must receive 60 hours of air drying—about six good days of drying. The usual test to determine sufficiency of drying is to press the thick part of the flesh between thumb and forefinger; if no impression can be made, the fish are sufficiently dried.

The cured fish are wrapped in waxed paper, packed in a thin wooden box, tightly covered, and stored in a cool, dry place. At the first signs of rust, mold, or reddening, scrub the fish off in a salt brine and dry in the air for a day or two.

FIG. 193. Shrimp sun-drying on platform.

PICKLING

Because of the abundance of our basic meats, the average American never has ventured into the culinary byways where there are to be discovered so many delicious surprises. We are prone to put into the discard such meats as tongues, brains, sweetbreads, spleens, hearts, kidneys, tripe, feet, and tails. Many of these meat organs are richer in iron and vitamins than the muscle meats. These, if prepared right, are just as full of food value and every bit as tasty as steaks and roasts. Chief difference is that some of them take more time in the cooking and more skill in the seasoning. But when one realizes that these so-called "variety meats" are not only nutritious but also delicious, he will be the first to experiment in utilizing them to the best advantage.

Pickling and spicing is an excellent way to preserve some of these meats, and it increases their piquancy and softens the fibers. The term pickled, although sometimes used to include meat, fish, and vegetables cured in brine, is applied here only to meat and fish in which vinegar, plain or spiced, wine, or cider is used in preserving.

Pickled Pigs' Feet. In the preparation of pickled pigs' feet, special care must be taken to clean them thoroughly as previously described (page 78). After the feet are cleaned and chilled they should be put in cure at once. The clean, chilled feet are usually

put in the ham brine for from 15 days to 3 weeks and then cooked or simmered slowly until tender. Cook them slowly enough so that the skin will not part too badly and the feet pull out of shape. The cooked, cured feet are then thoroughly chilled and packed in cold, moderately strong (35 grain) vinegar, to which spices such as bay leaves or allspice may be added. The feet may be used at once, but if kept in the vinegar for 3 weeks or even longer the quality and taste is greatly enhanced.

Pigs' Feet Souse. This is made by cooking cured or uncured feet in a little water until the meat slips from the bones. The meat and strained broth in which the feet were cooked are then seasoned with vinegar and spice, brought to a boil, put in molds, and allowed to jell. Additional cooked pork trimmings may be added.

Here is another way to make pickled pigs' feet. Split the cleaned, chilled feet and cover with water to which vinegar has been added. Cook the feet slowly enough so that the skin will not part too readily and the feet pull out of shape. Remove all scum. Add seasonings and boil slowly for 2 hours. After cooking, chill the feet and pack into a tight vessel, stone crock preferred, and cover with the hot broth. Later the feet can be served cold or fried in a batter of eggs, flour, milk, and butter.

4 pigs' feet
3 cups vinegar
1 onion
12 whole peppers
6 whole cloves
1 bay leaf
1 tablespoon salt

Pickled Tripe. The fatty inner-lining of the stomach of cattle and sheep (tripe) is prepared by thorough cleansing and boiling. Its large proportion of connective tissue readily gelatinizes on boiling, rendering it an easily digested food. It lacks flavor, but in the hands of a competent housewife or cook there are a great many methods of remedying this. Beef tripe is the kind most generally used. It should be thick, white, and fat—if dark and thin, the quality is poor. The "honeycomb" part is generally considered the best; this however, is a matter of individual opinion or taste. "Plain" or "regular," tripe is smooth. "Pocket honeycomb," shaped like a pocket, is the end of the stomach lining, the outside smooth, and the inside honeycombed. Calf's tripe is more tender than beef tripe.

Clean the tripe thoroughly and rinse it in cold water, then scald it in hot water (a little below the boiling point). When sufficiently scalded, the inside linings of the stomachs may be removed by scraping, which will leave a clean, white surface. Tripe should be boiled until tender; this usually takes about 3 hours. Then it is placed in

cold water so that the fat may be scraped from the outside. When this has been done, peel off the membrane from the outside of the stomach, and the clean white tripe is ready for pickling.

Place the tripe in a clean, hardwood barrel or earthenware jar, and keep submerged in a strong brine for 3 or 4 days. Rinse well with cold water and cover with pure cider vinegar, or a spiced pickling liquid. Place a weight on the tripe to keep it from floating on the surface of the liquid.

Spiced Corned Beef

This is made in the same manner as corned beef, but spices, garlic, and onions are added to the brine. In a cheesecloth bag put 4 ounces of pickling spices and two bulbs of garlic or 2 pounds of onions and place this in the brine with the meat. These amounts are for 100 pounds of meat.

Pickled Tongue [1]

1 beef tongue or 2 calf tongues
Vinegar to cover
Juice of one lemon
2 onions
6 whole cloves
1 teaspoon cinnamon
Salt
6 whole peppercorns
2 or 3 tablespoons sugar
¼ cup seeded raisins
1½ tablespoons flour

Cover the tongue with vinegar and soak for 24 hours. Drain and cover with water, adding lemon juice, sliced onions, cloves, cinnamon, salt and pepper. Cook slowly until tender, about 1 hour per pound. Skin and slice while warm. Brown the sugar. Strain liquid from tongue, adding 2 cups of liquid to sugar. Add raisins and then thicken the sauce with the flour that has been stirred until smooth with a small amount of cold water. Cook the sauce a few minutes, stirring frequently; add tongue and let simmer until thoroughly heated in sauce.

Spiced Tongue Slices [1]

1 beef tongue or two veal tongues
⅓ cup salt
1 quart water
2 pounds veal bones
3 pieces celery
12 cloves
2 bay leaves
12 whole pepper corns
2 cups sugar
2 cups vinegar
2 cups water
6 small onions

[1] Courtesy of Department of Home Economics, National Live Stock and Meat Board, Chicago, Ill.

Wash tongue thoroughly. Soak for two days in brine made by combining salt and water. Pour off brine. Cover tongue with fresh water. Add the veal bones, celery, and spices. Cook slowly until tender, about 1 hour per pound. Skin and slice. Cook sugar, vinegar, and water 10 minutes. Pour over tongue. Add thinly sliced onions. Store in cool place and use as desired.

Fish. Although few species of fish are pickled commercially, almost any kind may be preserved for home use.

Herring, both sea and river, are the most important fish for pickling. Other popular species are haddock, mullet, catfish, salmon, carp, buffalo fish, eels, lake herring, lake trout, pike, pickerel, and shellfishes, especially shrimp, oysters, clams, and mussels. Practically all other food fishes, both fresh and salt water, are pickled by noncommercial or home methods to some extent.

Fish that are pickled or marinated do not keep as long as those preserved by salting or drying. This difference is due partly to local weather conditions, species of fish, and the method of pickling. The acetic-acid content of the vinegar is also a factor. To stop bacterial growth requires a vinegar with an acetic-acid content of 15 per cent. The ordinary commercial vinegar contains 5 to 6 per cent, and even this may be too strong for the average palate. Pickling solutions containing as little as 3 per cent acetic acid, however, will retard spoilage for a week or more, and the product may even be preserved for months if stored in a cool place at a temperature of about 50°F.

Distilled vinegar is preferred since it has a standardized acetic-acid content. Cider or other fruit vinegars are usually considered unsuitable since the acetic-acid content is extremely variable, and the fruit residues in the vinegar may give the fish an "off" taste. Spices and herbs used in pickling should be fresh. Best results are obtained by securing whole spices and herbs and crushing and grinding sufficient quantities to make up the recipe at the time of pickling.

Herring. The first step in pickling herring is to cut off the head, and trim off the thin belly-flesh to the vent. Clean the cut herring thoroughly, paying special attention to removal of the kidney which is a dark streak along the backbone. Wash the fish in fresh water and drain. Pack the drawn fish loosely in a crock, and cover with a brine testing 80° salinometer (⅝ cup of salt to 1 quart of water) and containing sufficient vinegar to give it an acidity of 2.5 per cent. This requires about equal quantities of water and distilled vinegar.

The fish are left in this brine until the salt has "struck through," but must be removed before the skin starts to wrinkle or lose color.

Length of cure, therefore, depends upon the judgment of the pickler, and varies with the temperature, freshness, and size of the fish. The average time is about 5 days, but may vary from 3 to 7 days.

When the herring are judged sufficiently cured, they are repacked more tightly, a very little dry salt is scattered among them, and they are covered with a salt vinegar pickle one-half the strength of that previously stated. The crock is stored in a cool place. At this stage, the fish cannot be kept for more than 2 or 3 weeks.

The final process in pickling herring is the soaking of the herring in a tub of cold water for 8 hours. Remove the fish, drain, and place in a crock and cover with a solution of vinegar, salt, and water for 48 hours. This solution is made up in the proportions of 1 gallon of 6 per cent distilled vinegar, 1 gallon of water, and 1 pound of salt. Some prefer to eliminate this last step, utilizing the herring immediately after they have been freshened in cold water.

Cut Spiced Herring

The quantities given in the following recipe are sufficient for 10 pounds of cleaned herring. Whole spices are used.

1 quart vinegar
1 pint water
3 ounces allspice
2 ounces bay leaves
2 ounces mustard seed
1 ounce black pepper
1 ounce red peppers
1 ounce white peppers
1 ounce sugar
½ ounce cloves
½ ounce sliced onions

Cut the vinegar-salt-cured herring across the body in pieces 1 to 1½ inches long. Pack in layers in a crock with sliced onions, bay leaves, and spices. Cover with vinegar diluted with water in which the sugar is dissolved. Allow this liquid to stand in a cool place at least 24 hours before using. The cut, spiced herring may be repacked in pint or quart glass jars. If packed in jars, the herring may be stored in a refrigerator where it will remain in good condition for as long as 6 months. Add to each jar a few fresh spices, a bay leaf or two, and a slice of lemon at the side of the jar to give an attractive appearance. Rubber jar rings should not be used, since the vinegar causes them to deteriorate.

There are more formulas for pickled herring and other species such as carp, pike, salmon, eels, clams, oysters, mussels, and shrimp, but that would require more space than is available for fish in this

book. These additional formulas and instructions are given in *Fishery Leaflet 18,* Home Preservation of Fishery Products (a copy of which may be obtained on request to the Fish and Wildlife Service, United States Department of the Interior, Washington 25, D. C.).

Drying Meat and Fish

Probably the first method used to preserve meat and fish was drying in the wind and sun, sometimes with smoke to intimidate the flies. Thus treated, fish and meat became an article of commerce and of food for man and beast; could be stored for years if kept dry; were portable, durable, nourishing; and could be eaten with or without boiling.

This method of preserving meat and fish on the North American continent was developed by the Indians, and the white man learned it from these aborigines.

Not only do times change but names change with it. Dried meat was desiccated meat in World War I and dehydrated meat during World War II. This dried meat, a concentrated protein material, is nutritious, palatable, and easily stored for months at ordinary atmospheric temperatures. It was developed to meet an emergency and to save refrigeration facilities and tin-plate cans.

Char qui from the French also means dried meat. *Biltong* is a Dutch South African term for strips of sun-dried meat of antelope, buffalo, and other animals. "Jerky" or jerked beef is the name given by our pioneers to meat dried in this manner.

Pemmican. This is the Cree Indian word for meat prepared in such a way as to contain the greatest amount of nourishment in the most compact form. The Indians made it of lean parts of meat—deer, antelope, and buffalo—dried in the sun and pounded or shredded and mixed into a paste with melted fat. They flavored it with acid berries. If kept dry, it would keep for an indefinite time and is thus particularly serviceable in Arctic and other explorations.

Pemmican is not only used as an emergency ration by explorers, but hunters, canoers, and hikers rely upon it. Here is how it is made.

Cut the lean meat of venison or beef into very thin slices. Hang them in the sun where flies and dirt cannot contaminate them and allow them to dry thoroughly. The strips may also be dried by suspending them over a low fire made of hickory or ash wood until they become brittle. The drying process may require a few hours or a day depending on the humidity.

Pound or grind the dry strips of meat into a coarse powder and work in enough hot fat to make a thick dough. Dried fruits such as raisins, apricots, or prunes may be pounded or ground with the meat before the fat is added.

Form the pemmican into one or more loaves and enclose it in a canvas or muslin casing so that it resembles an old-fashioned plum pudding. Dip the loaf into melted paraffin to seal the wrapping and make it watertight, and then store it in a dry place.

Jerked Beef (dried beef). This was originally made by cutting beef into long, thin strips dried in the air, without having been previously immersed in brine. Later on it became the custom to cure the meat lightly in brine before it was air-dried. The word "jerked" comes from the Spanish-American *charqui.*

Jerked Venison. Nearly every hunter has his own ideas about making "jerky." It is customary to cut the meat into strips 2 to 3 inches thick. They are then dipped into boiling hot brine. The meat is placed on a smoking rack built of sticks. A fire is made with green maple or other hardwood and, when the fire burns low, the rack with the meat on it is placed over the fire and the meat is thoroughly seared. The fire should not be permitted to blaze, only to smoke, or the meat will be cooked instead of jerked. Flies will not bother this meat. After it is smoked the meat should be dried in the sun as much as possible.

Dried Beef. Our modern dried beef, sometimes called chipped beef, is generally made from the round. The three muscles comprising this portion of the beef are split lengthwise along the natural seams. This is done so that the muscle fibers may be cut crosswise when the dried beef is sliced for table use. The larger muscle may be split farther in order to have more uniform size of pieces. The inside of the thigh is considered the choicest piece because it is generally more tender. Cure the meat in the same manner as that described for corned beef (page 209) with the exception of adding an additional pound of sugar per 100 pounds of meat. Allow the meat to cure about 2 days for each pound of weight of the pieces. After being removed from the brine, drained and dried, it is ready for the smokehouse.

The drier the climate in general, the more easily can meats be dried. In arid regions, good dried meat can be made by exposing it fresh (if protected from flies and dirt) to the air.

Fish. Preserving fish solely by drying in the open is not practiced extensively in this country. This is because the weather is not suitable in many localities and because the flesh of many species avail-

able to the noncommercial fisherman has a fat content of 5 per cent or more. Therefore it is difficult to preserve fish by air-drying alone. Another reason is that a combination of salting and drying requires much less time and skill than air-drying alone. However, the Indians in Alaska and Canada still air-dry fish to some extent. In the North Pacific and Atlantic States (and for shrimp drying, in the Gulf of Mexico area), air-drying offers some possibilities for those desiring to preserve fish at home.

Rackling. This product was introduced to this country by Scandinavian fishermen who prepare it for home use. Large flounder, halibut, pollock, cusk, hake, rock cod, or similar fish with a fat content of about 2 per cent are suitable. The head is removed, leaving the collarbone. The fish is split into two sides and the backbone removed. Then the sides are cut in long, narrow strips about an inch in width, left joined together at the collarbone. They are washed thoroughly so that all traces of blood are removed and then soaked in saturated salt brine for 1 hour. They are hung out to dry, preferably in a shady place where they will not be exposed to direct sunlight. Drying requires from 1 to 2 weeks. When wanted for use, the rackling may be soaked for a few hours, and steamed and made into fish cakes, fish loaf, or creamed fish. It is most often eaten like jerked meat, however, without any preliminary preparation.

Dried Shrimp. Small shrimp not suitable for the commercial market, or large catches which cannot be used fresh, may be dried at home. The shrimp are first washed thoroughly, picking out all bits of seaweed and other foreign material, and allowed to drain. Prepare salt brine in the proportions of ½ cup of salt to one quart of water. Bring to a boil, put in the whole washed shrimp. Allow them to boil for about 10 minutes, counting the time from the moment when the brine begins to boil after the shrimp have been added. When the meat has separated from the shell it is cooked, which may be determined by breaking open a shrimp. Spread the boiled shrimp in a thin layer to dry in the sun. A slanting shed roof makes an excellent drying platform. The layer of shrimp must not be more than 1 inch thick. Turn them at half-hour intervals during the first day of drying, so that all parts of the layer will be equally dried. The shrimp are gathered at night and stored in a dry, well-ventilated place. This must also be done at the first sign of rain. Do not place a covering directly on the shrimp or they will start to heat and sour.

Drying requires about 3 days if the weather is good, and longer if drying conditions are unfavorable. When the shrimp are thoroughly dry and hard, place them in a sack. Beat the sack with a piece of board. This separates the shells from the meats. Then take a wooden-frame, wire-mesh screen with ¼ inch mesh and set it up at an angle. Shovel the mixture of meats and shells against the screen as in sifting sand. The bits of shell and waste fall through, while the meats roll down to the bottom of the screen. From 100 pounds of green shrimp, 12 or 13 pounds of dry shrimp should be obtained, together with an equal amount of shell. The dried shrimp meat may be soaked in water for a few hours, wiped dry, rolled in butter or in oil, and fried. They are also excellent in curries, gumbos, and jambalayas. When the dried meats are ground and mixed with butter and spices, they make an excellent sandwich spread. The dried meats are also used with beverages as appetizers.

Smoking Meat and Fish

Smoked meats are those preserved by wood smoke following their curing by the dry- or brine-cured methods. Cured meats are generally smoked before they are put into storage. If the smoky flavor is not desired and the meat is not smoked, it should be hung up to dry until the dry-cured meat loses about 5 per cent of its cured weight and the brine-cured meat loses about 10 per cent.

Cured meats are smoked primarily to give them their familiar color and flavor. Smoking lowers the moisture content, imparts an attractive mahogany brown color and mild, smoky aroma, and furnishes some protection against bacteria and oxidation. Relatively high smokehouse temperatures (110°F. or above) with a light smoke will speed up the drying; lower temperatures (80° to 110°F.) with a dense fog of smoke will intensify the smoky flavor in meat.

Smokehouse temperatures vary according to the type of cured and smoked product that is being produced. Meat for storage at air temperatures should be smoked in a temperature of 135°F. until the inside of the meat has reached 110°. Then the smokehouse temperature is lowered to 110° and maintained until the desired color is attained.

After the meat has been cured, it is removed from cure, washed, and hung up to dry, or it is soaked and then dried. Meat that has remained in cure too long should be soaked for an hour in warm water to dissolve some of the surface salt. After it is washed it should be allowed to dry overnight.

Smokehouses. Many types of smokehouses are used successfully to smoke meats, fowl, and fish. These houses range from the temporary "one-hog" type made from a 50-gallon barrel to permanent structures suitable for both smoking and storing meat.

Smokehouses should be of reasonably tight construction to permit easy regulation of temperature and flow of smoke and air. A rapid flow of air past the meat is needed at the beginning of the smoking operation to drive off surplus moisture. Less rapid air movement near the end of the smoking period prevents excessive shrinkage in the weight of the meat.

The drawings that follow were made by the agricultural engineers, United States Department of Agriculture. These drawings show details, so that blueprints will not be required by the builder.

Barrel Smokehouse. A 50-gallon barrel, with both heads removed, or a box with tight sides, can be used for smoking small quantities of meat, fowl, or fish. Set the barrel, with head and body removed, over the upper end of a shallow, sloping, covered trench and dig a pit at the lower end for the fire. The heat of the fire can be controlled by covering the pit with a piece of sheet metal and mounding earth around the edges, so as to cut off most of the draft. Clean muslin or burlap hung over the top of the barrel will protect a 1-inch opening between the barrel and the cleated top, which rests on broomsticks supporting the meat.

Frame or Concrete Type. A smokehouse large enough for the average family needs is easily constructed out of wood and concrete. The outside fire pit makes temperature control easy and reduces the fire hazard. Tight construction and well-fitted ventilators pro-

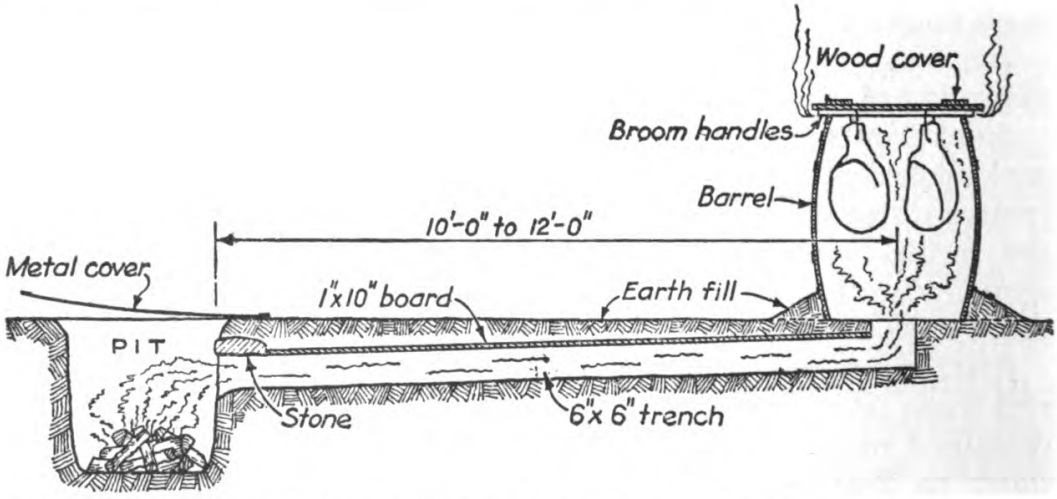


FIG. 194. Barrel smokehouse. Smokepipe, or tile if available, could be used for the flue.

vide effective regulation of the air flow past the meat. Movable two-by-fours across the house for hanging the meat enable the operator to adjust the hangers to the size of the pieces of meat being smoked. Two or more tiers of meat can be hung in the house. A taller house, holding four more tiers of meat, can be served by the same fire pit.

The cost of the lumber and other materials for this 6-by-6 by 8-foot smokehouse will be about $65 if they must be bought new. If built of commercial concrete blocks the cost will be about $85. These prices may range widely in different localities. Masonry construction reduces the fire hazard. Local stone which does not require much dressing or skill for shaping the pieces can be used at low cash cost. Logs are satisfactory if well fitted and chinked.

The frame type of smokehouse should not be located nearer than 50 feet to any other buildings.

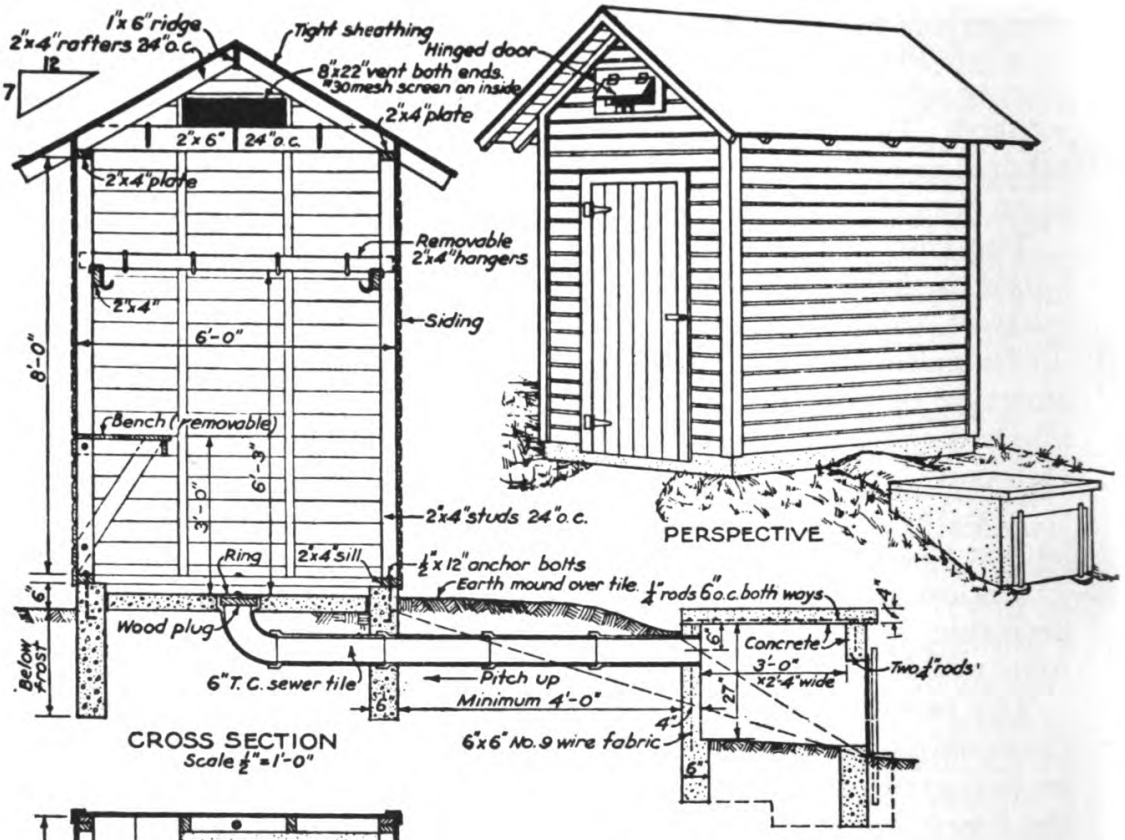
A solid frost-proof foundation is essential. A concrete floor is desirable, as it can be made rat-proof and is more easily cleaned than wood.

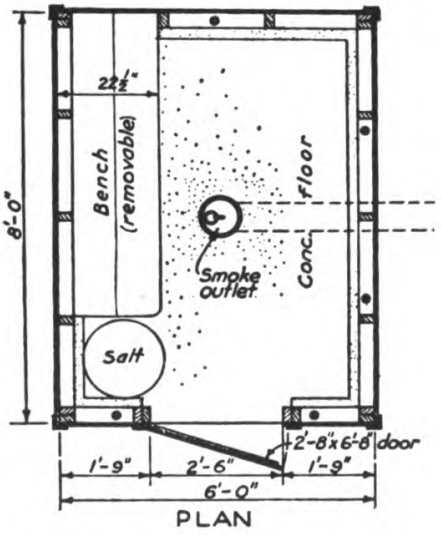
The picnic-type firebox with a removable cover can also be used for cooking meals out-of-doors. Broiled and barbecued dishes can be prepared on this outside fireplace. The smoke pipe leading to the house must be plugged when the firebox is used as a stove or grill. A simple earthen pit at the end of the flue could be used instead of the concrete or brick firebox shown. Also a small wood-burning stove could be connected with the smoke pipe. In all cases, it is desirable to slope the pipe slightly upward toward the outlet in the smokehouse and to cover it with earth or masonry. This covering will hold the heat and, in connection with the slope, give a more positive draft.

Ventilators should be built into the gables as shown in the drawings; a ventilator built in the roof is difficult to keep watertight.

Meat can be crowded into a smokehouse, the only rule being that no piece touch another or the wall. The space required varies with the weight of the cut, but 12 inches in width both ways and 2 feet in height for each piece is a fair basis for estimating the capacity of the house. Movable rails and staggered hooks will make it possible to adapt the equipment to the quantity of meat to be smoked.

Remember that well-built, fly-tight smokehouses are not safe places to store unbagged smoked meat. Ultimately flies or fly eggs will get in, either on a piece of meat or when the door is opened. Smokehouses are used satisfactorily for storing meat if each piece is properly wrapped, bagged and hung separately, provided it is fly-proof and, perhaps, thief-proof.





BILL OF MATERIALS

SMOKEHOUSE

CONCRETE 1:3:5 mix
10 bags cement, 1 cu. yd. sand, 1½ cu. yds. gravel.

LUMBER

3 pieces	2" x 6" x 6'-0"	cross ties.
3 "	2" x 4" x 12-0"	header, bench and hangers.
12 "	2" x 4" x 10'-0"	sills, studs, and rafters.
23 "	2" x 4" x 8'-0"	" , " , plates, and hangers.
2 "	1" x 10" x 8'-0"	bench and vent doors.
2 "	1" x 6" x 10'-0"	ridge and trim.
2 "	1" x 6" x 7'-0"	door battens.
6 "	1" x 4" x 10'-0"	corner boards and trim.
6 "	1" x 4" x 8'-0"	trim.
6 "	1" x 6" x 7'-0"	T. & G. boards for door.

275 ft. B.M. 6" drop siding.
120 ft. B.M. roof sheathing.
Roofing or asphalt shingles to cover 100 sq. ft. roof area.

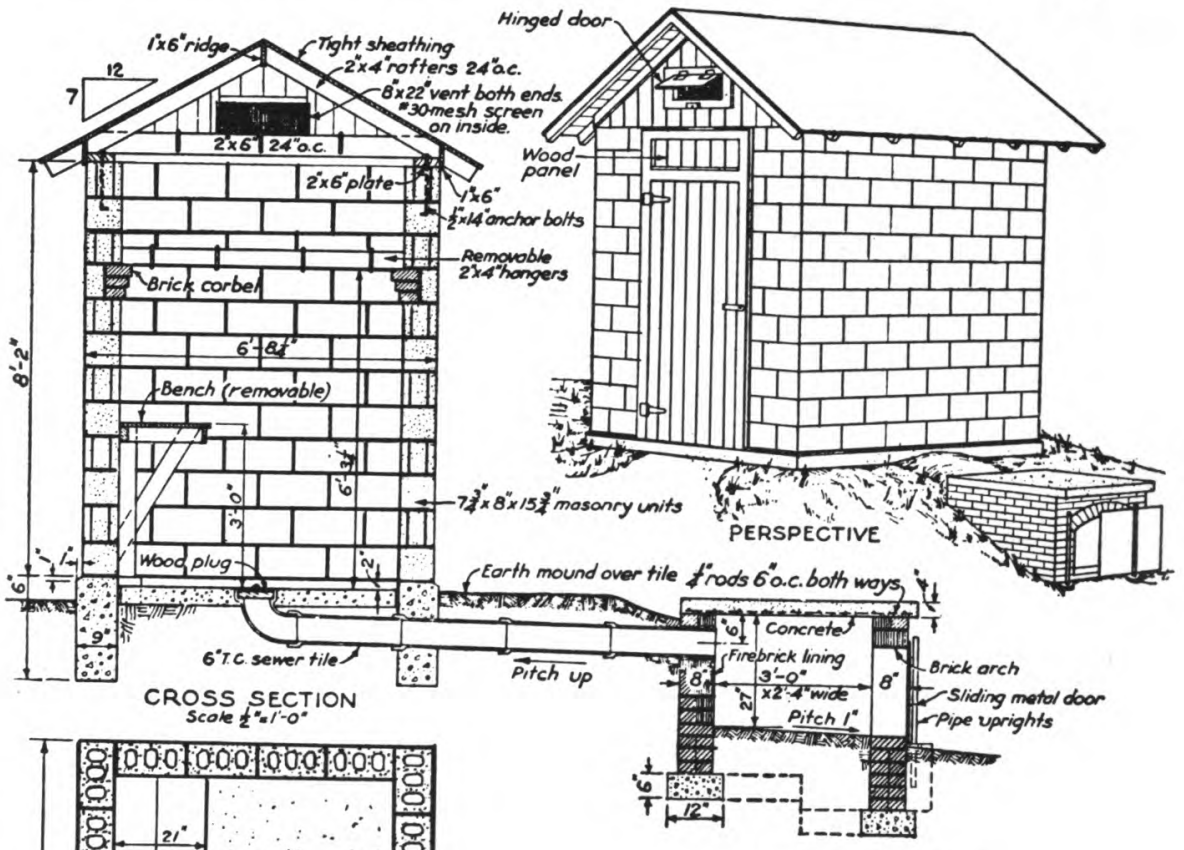
MISCELLANEOUS
7-½" x 12" anchor bolts, with nuts and washers.
1 pair 8" Tee hinges, 1 safety hasp.
2-pair 2" x 2" hinges, for vent doors.
1-piece metal flashing - 6" x 40"
4 lin. ft. #30-mesh wire screen - 10" wide.
4 lengths 6" T. C. sewer pipe, 1-6" 90° T. C. elbow.
Nails, hanging hooks, and paint not included.

FIREBOX

CONCRETE 1:2:3 mix.
6 bags cement, ½ cu. yd. sand, ½ cu. yd. broken hard brick, gravel or stone (brick more heat resistant)

MISCELLANEOUS
10 lin. ft. 6" x 6" No. 9 wire fabric 30" wide.
6 pieces ¼" steel rods 42" long.
10 " " " 32" "
2 " 1¼" pipe 36" long.
1-piece 24" x 32" metal, sliding door.

FIG. 195A. Drawing and bill of material for frame smokehouse.



BILL OF MATERIALS
SMOKEHOUSE

CONCRETE AND MORTAR.
Concrete 1:3:5 mix. Mortar 1:3 + 10% lime.
14 bags cement, ½ cu. yds. sand, 2 cu. yds. gravel
65 lbs. hydrated lime.

142	8"	x 8"	x 16"	smooth face masonry units.	
12	8"	x 4"	x 16"	"	"
2	8"	x 4"	x 8"	"	"
14	8"	x 8"	x 8"	" half "	"
52	8"	x 8"	x 16"	" corner	"
12	8"	x 8"	x 16"	" jamb	"
12	8"	x 8"	x 8"	" half "	"

100 common brick

LUMBER

4 pieces	2"	x 6"	x 8'-0"	plates and door jambs.
6 "	2"	x 6"	x 7'-0"	" cross ties
9 "	2"	x 4"	x 10'-0"	rafters, gable end studs.
7 "	2"	x 4"	x 6'-0"	bench and removable hangers
3 "	2"	x 3"	x 8'-0"	door casing.
5 "	1"	x 6"	x 10'-0"	" battens, ridge, trim.
9 "	1"	x 4"	x 10'-0"	trim
1 "	1"	x 12"	x 6'-0"	bench
1 "	1"	x 10"	x 10'-0"	" and vent doors

120 ft B.M roof sheathing 56 ft B.M 1"x6" T&G door gables
Roofing or asphalt shingles to cover 100 sq. ft. roof area

MISCELLANEOUS
8-½"x14 anchor bolts. 1 pr 8" tee hinges 1 pr 2"x2" hinges
6"x38" metal flashing 4 lin. ft #30 mesh screen 10" wide
Nails, hanging hooks and paint not included

FIREBOX
7 bags cement, ½ cu. yd. sand ⅔ cu. yd gravel
450 common brick. 90 firebrick
9-½" steel rods 40" long, 6-½" steel rods 48" long
2 pieces 1½" pipe 36" long
1 metal sliding door 24"x32"

FIG. 195B. Drawing and bill of material for cement-block smokehouse.

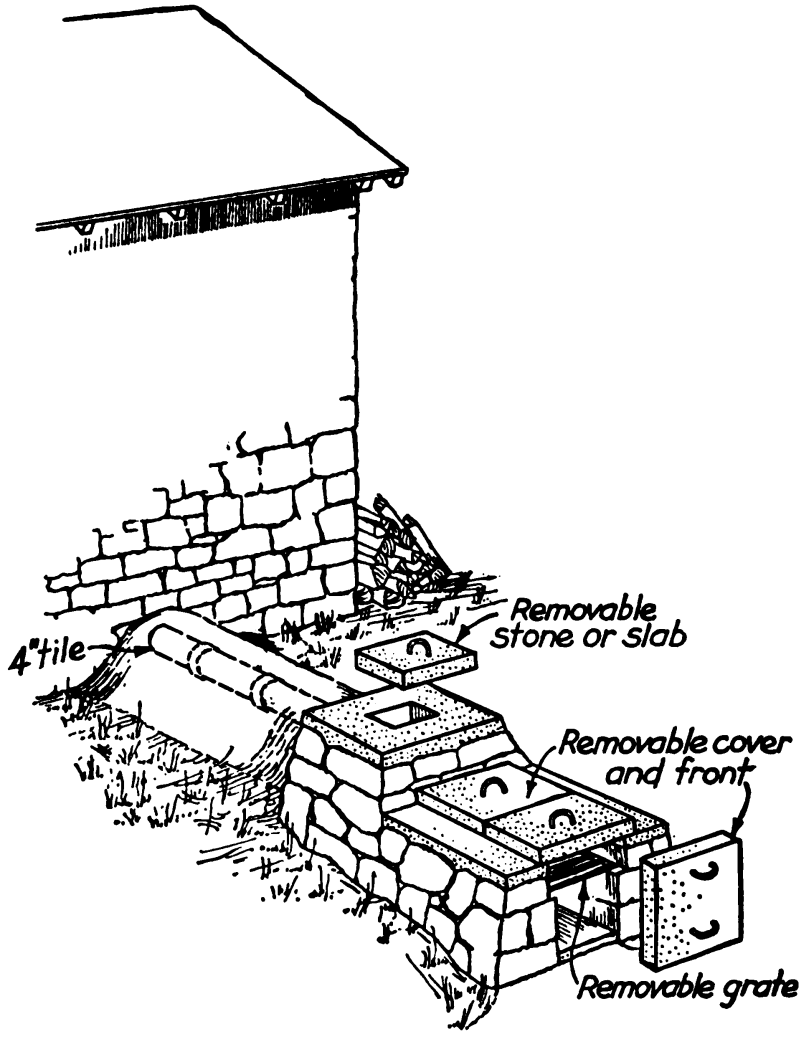


FIG. 196. Picnic-type firebox.

Proper Wood. Woods used for smoking depend much upon the locality and availability. In order of preference for smoking are hickory, maple, birch, ash, oak, dried apple wood, and dry willow. Green hickory wood and sawdust are the standard fuels for smoking meat. Where timber is scarce corncobs may be used. Soft or resinous wood should not be used, for it will blacken the meat and give it an undesirable flavor. If paper or pine shavings are used to kindle the green hardwood, be sure that all have been completely burned or removed from the fire before the smokehouse door is closed. It is better, however, to start the fire with the used woods and not with paper or shavings from soft woods, because the ashes of these products rise and stick to the meat.

All pieces to be smoked should be strung and scrubbed with warm water to remove the excess salt and grease. Hams and shoulders should be strung through the shank. Unless a regular stringing needle is at hand, make an opening through the shank with the narrow blade of the boning knife and pull a stout string through with a wire loop. A wooden or wire skewer is usually run through the flank end of the bacon strip and the string inserted just below it. In the case of bacon, it is better to insert two loops just off the center so that the piece hangs smoothly without wrinkling. If wrinkling is permitted, the meat is hard to slice and some waste will occur.

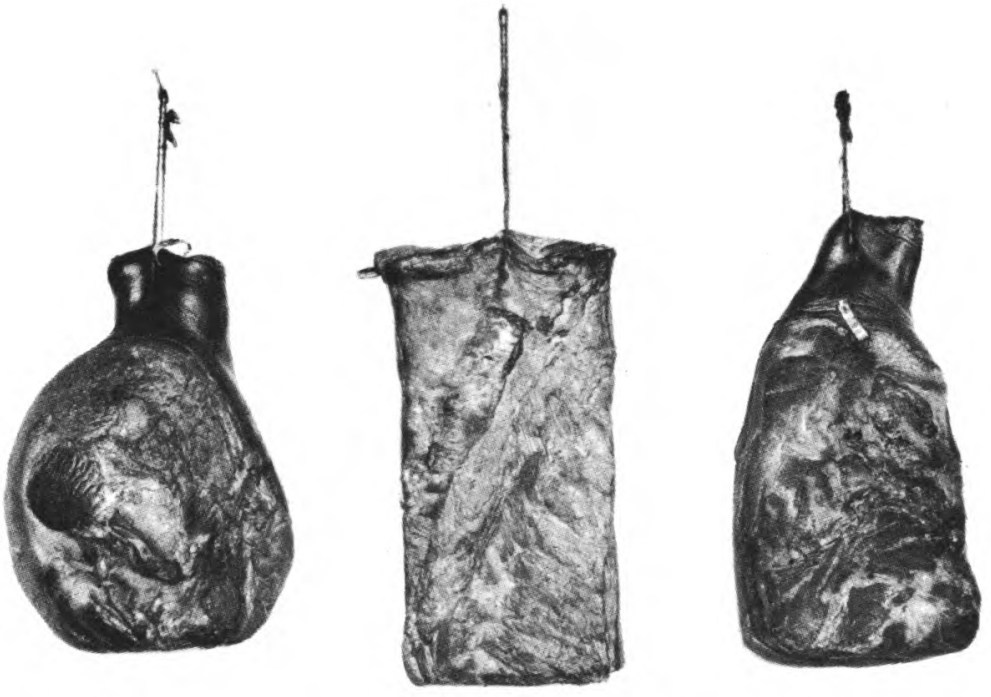


FIG. 197. Well-trimmed and smoked ham, bacon and shoulder. It pays to trim cuts smoothly and evenly.

A good procedure is to hang the cured washed meat in the smokehouse overnight to drain and dry. Start the fire in the morning. If the meat is still dripping when smoking begins, hang the lower pieces in such a manner that the drippings do not strike the meat and make it streaked. Do not permit any two pieces of hanging meat to come in contact.

Pork. Cured pork may be smoked at a temperature of 100° to 120°F. The ventilators should be left open, especially at first, to

permit the moisture to escape. A heavy fog of smoke is not necessary. Continue the smoking until the meat has the desired color. Two days smoking should make it a rich mahogany brown.

Meat that is to be aged or held for summer use is usually smoked more slowly. The temperature is held at 70° to 90°F. and the fires rebuilt intermittently over a period of from one to several weeks. This smoking and drying process helps to preserve the meat and to develop a mellow flavor characteristic of smoked pork that has been aged several months.

Beef and Lamb. Cured beef and lamb are smoked in the same manner as pork. The pieces to be smoked should be removed from the cure 2 or 3 days before being put into the smokehouse. If cured in a strong brine, it is best to soak the pieces about 3 hours in cold water to prevent a crust of salt from forming on the outside when the beef is smoked. Washing the meat in tepid water and scrubbing clean with a brush is a good practice. The pieces should then be hung up to drain. After being drained they may be hung in the smokehouse.

When the fire is kept going steadily and an even temperature is maintained, from 24 to 36 hours will be required to finish one lot of meat. The meat should be cooled by opening the ventilators or doors as soon as it is smoked sufficiently. When hard and firm, it may be wrapped properly and stored for use later. Dried beef may be used any time after it is smoked, although the longer it is stored, the drier it will become.

Lamb may be exposed to hardwood smoke for about two days at a temperature of about 100° to 120°F. in the same manner as cured pork. The meat may be removed from the smokehouse as soon as it is satisfactorily colored, or left in for longer or intermittent smoking if desired.

Fowls. Turkeys, ducks, and other birds after taken from the cure should be rinsed in fresh water and drained thoroughly. Be sure that none of the cure is left in the pockets of the body cavities. Put the bird in a stockinette and hang breast down. Another method is to loop a cord under each wing close to the body, tying the cord in the center above the back. Hang the birds and let them drip until dry. Allow them to hang in this manner, breast down, when being smoked. This provides for maximum exposure of skin as well as an opportunity for further drainage.

For cured turkeys, make a fire of hardwood and maintain a temperature of 135° to 140°F. for about 16 hours. This is more effective in producing desirable color than lower temperatures. However, a

temperature of approximately 110°F. for 20 hours results in about 3 per cent less weight loss in the smokehouse than the higher temperature for a shorter period of time. After smoking the turkeys should be aged 4 weeks at 68°. The smoked turkey produced by this process must be cooked before eating.

To produce a smoke-cooked turkey that is ready for eating without further cooking, the following procedure is recommended by the Extension Service, Texas A. and M. College, College Station, Texas:

Make a brine of the following: 10 gallons of water; 9 pounds of salt; 1 pound of prague powder; 1½ pounds of sugar; 4 ounces of ham spice emulsion. This mixture should give a reading of 45 to 50 per cent saturation when measured with a sodium chloride salinometer.

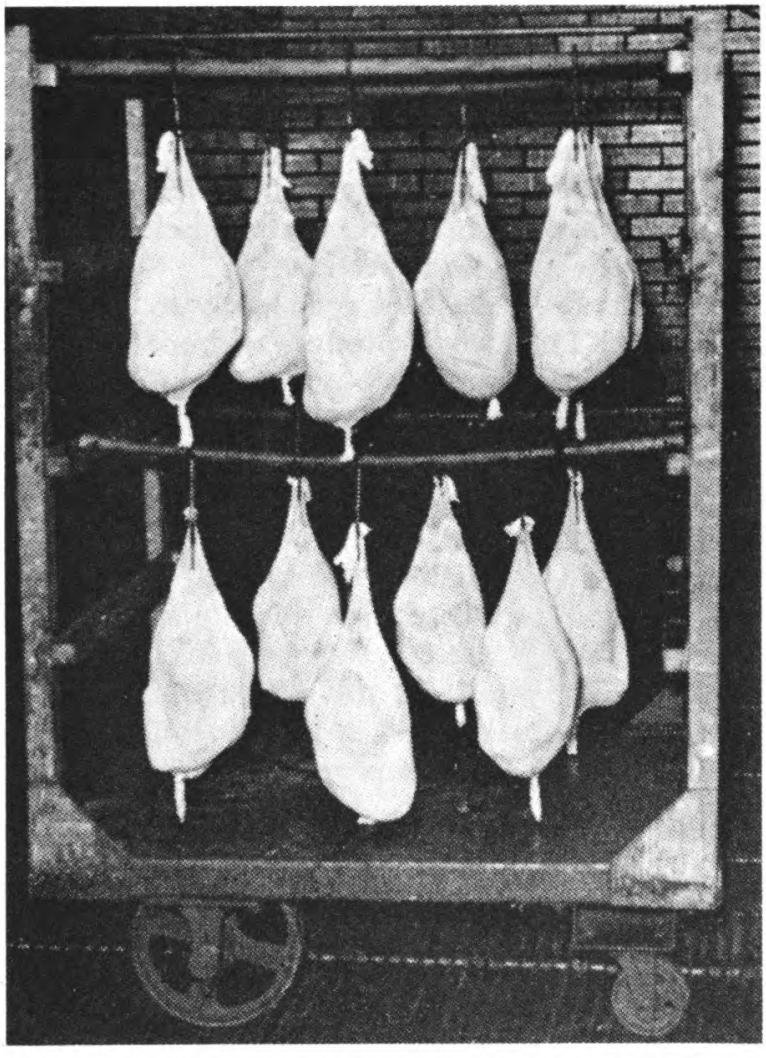


FIG. 198. Turkeys and ducks smoking in stockinettes.

After the bird has been dressed and chilled thoroughly, it must be pumped for curing. Pump the fowl with the brine mixture by injecting 10 per cent of its weight. Stitch with pressure pump, using small or medium-sized needle. Pump bird to give uniform distribution of brine in all muscles. This will require on each side of the bird three stitches in the breast, one in the thigh, one in each drumstick, one in each wing, and one in the back.

After pumping has been completed cover the bird with the brine mixture and be sure it is completely submerged. Keep it in the solution for 3 days. Remove and drain thoroughly. Be sure that none of the brine is left in the pockets of body cavities. Put it in stockinette and hang breast down. After it is about dry, put it in the smokehouse with the heat control set at 170°F. As soon as it is completely dry, smoke can be applied. Smoke to a light lustrous pecan-nut brown. This usually takes 8 to 10 hours.

When the desired color is obtained, increase the temperature in the smokehouse to 185°F. Cook the bird until the inside temperature at the thickest breast muscle area is 160°F. To determine the heat accurately it is necessary to insert an inside meat thermometer in the bird at the thigh joints and breast muscles. Approximately 20 per cent shrinkage may be expected.

This process will cook the bird sufficiently to be eaten without additional cooking. The cooked product will not keep under an ordinary refrigerator temperature any longer than other meats, such as cured ham. If the birds are to be held longer than two weeks they should be frozen, packaged, and held at 0°F.

Fish. Smoking is a method which should be used more extensively in home food preservation of fishery products, says the U. S. Fish and Wildlife Service. When the curing is properly done, it is inexpensive and the product is of high quality, attractive in appearance and taste. Although preservation by smoking usually lasts for a shorter time than by salting, the product is more appetizing. If smoked fish spoils quickly and is poor in quality, it is because the smoking has been done improperly. If proper attention is given to materials and methods, little difficulty should be experienced.

The efficiency of smoking depends on the drying action; it is only a flavoring and coloring agent. According to species, fish may be smoked either in the round, gutted, split and beheaded, or cut into pieces with or without the skin removed.

There are two general methods of smoking fish: hot-smoking or barbecuing, and cold-smoking. In hot-smoking, the fish are hung near the fire, usually not more than 3 or 4 feet distant, and smoked

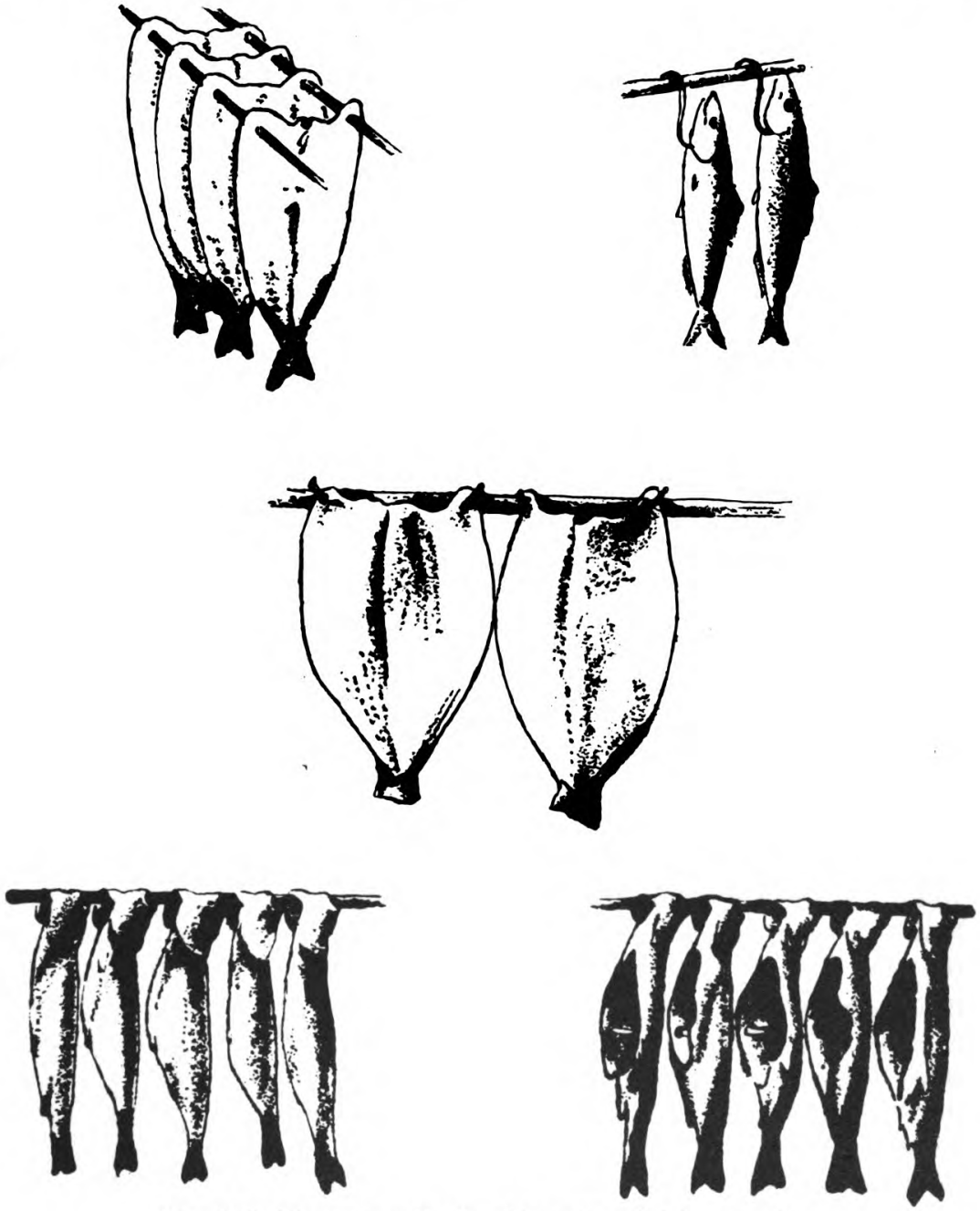


Fig. 199., Various methods of hanging fish for smoking.

at temperatures from 150° to 200°F. so that they are partially or wholly cooked. Therefore, while hot-smoked fish is very appetizing, and requires no preparation, it will keep for only a short time. In cold-smoking, the fish are hung at some distance from a low smouldering fire and smoked at temperatures usually lower than 90°F. (a temperature of 90°F. may be used occasionally). The degree of

preservation depends on the length of time the fishes are smoked; fish cold-smoked a few hours, for example, will keep only a short time. If an extended period of preservation is desired, fish must be cold-smoked from a few days to a week or more. The same general principles governing the smoking, handling, and storing of cured meats should be followed with fish.

Hot-Smoking. Almost any species may be hot-smoked. Mullet, shad, Spanish mackerel, mackerel, alewives or river herring, herring, lake herring, whitefish, and king mackerel. This method is recommended if it is desired to prepare a fish that can be used immediately without cooking. Fish smoked by this method may be kept longer without molding or souring, but even so, it will preserve for only a short time.

Split the fish along the back, just above the backbone so that it will be open in one piece, leaving the belly solid. Scrape out all viscera, blood, and membrane. Make an additional cut under the backbone for the smaller fish. For the larger fish, cut out the forward three-fifths of the backbone. Wash thoroughly and soak in a 70° salt brine (½ cup salt to 1 quart water) for 30 minutes to leach blood out of the flesh. Then prepare a brine, using the following ingredients: 2 pounds salt, 1 ounce saltpeter, 1 ounce crushed black peppercorns, 1 ounce crushed bay leaves. This makes a 90 per cent brine (saturated salt solution). The amounts of ingredients are increased in proportion to the amount of brine to be made. The spices used may be increased both in variety and quantity.

The fish are held in this brine for periods varying from 2 to 4 hours, depending upon their size and thickness, amount of fat, and the desire for a light or heavily cured fish. Weather conditions also make a difference; the exact length of time must be determined by experiment. Rinse off the fish in fresh water and hang outside in a cool, shady and breezy place to dry for about 3 hours before hanging in the smokehouse, or until a thin shiny "skin" or pellicle has formed on the surface.

For the first 8 hours that the fish are in the smokehouse, the fire is low and smoldering. The temperature should not be higher than 90°F. A dense smoke should then be built up. After 4 hours of heavy smoking, the fire is increased until the temperature is between 130° and 150°F. The fish are cured at this temperature for 2 to 3 hours, or until they have a glossy, brown surface. This partially cooks, or hot-smokes, the fish.

When smoking is finished, the fish must be cooled for 2 or 3 hours. They may be brushed over lightly with vegetable oil (usually cot-

tonseed) while warm. This is sometimes done just after finishing the cold-smoking part of the process. The oil forms a light protective coating, but the chief value of this treatment is to make the appearance more attractive. Another method is to dip the fish in melted paraffin; thus, a more effective protective coating is formed, but the fish must be handled carefully as the coating is brittle. The paraffin must be peeled off when preparing the fish for the table. Each fish should be wrapped in waxed paper and stored in a cool, dry place. Spoilage occurs more rapidly if the fish are stored in a warm place or under damp and cold conditions.

Cold-Smoking. Small fish, such as sea herring, alewives (river herring), spots, or butter fish may be cold-smoked in the round (without cleaning), but they should be gibbed. Gibbing consists of making a small cut just below the gills and pulling out the gills, heart, and liver, leaving the belly uncut. Fish larger than one pound should be split along the back to lie flat in a single piece, leaving the belly portion uncut. All traces of blood, black skin, and viscera must be removed, paying special attention to the area just under the backbone. The head does not need to be removed. If the head is cut off, the hard bony plate just below the gills is allowed to remain, as it will be needed to carry the weight when the fish are in the smokehouse.

Next wash the fish thoroughly, whether gibbed or split, and place them in a brine made in the proportion of 1 cup of salt to 1 gallon of water. They should be left in the brine at least 30 minutes to soak out blood diffused through the flesh. At the end of this time rinse in fresh water to remove surplus moisture, and drain for a few minutes.

Each fish is dropped singly into a shallow box of fine salt and dredged thoroughly. The fish is picked up with as much salt as will cling to it, and packed in even layers in a box or tub. A small amount of salt may be scattered between each layer. The fish are left in salt from 1 to 12 hours, depending upon the weather, size of fish, fatness, length of time for which preservation is desired, and whether the fish are round or split.

When the fish are taken out of the salt, they should be rinsed thoroughly. All visible particles of salt or other waste should be scrubbed off. They are hung to dry in the shade as described in dry-salting (page 220) of fish. An electric fan may be used if there is not enough breeze. The chicken-wire drying racks used in dry-salting may be utilized if they are not exposed to direct sunlight. The fish will dry on both sides but the impression of the chicken wire

detracts from its appearance. The fish is dried until a thin skin, or pellicle, is formed on the surface. This should take about 3 hours under average conditions. If smoking is begun while the fish are still moist, the time required is longer, the color will not be as desirable, the fish will not have as good a surface, and will steam and soften in smoking.

Start a low, smoldering fire an hour or two before the fish are hung in the smokehouse. It must not give off too much smoke during the first 8 or 12 hours if the entire cure is 24 hours, or for the first 24 hours if the cure is longer. The temperature in the smokehouse should not be higher than 90°F. in California or the southern states, or 70°F. in the northern states. If available, a thermometer should be used in controlling smokehouse temperature; if not, a rule-of-thumb test is to insert a hand in the smokehouse and if the air feels distinctly warm, the temperature is too high.

At the end of the first smoking process, a dense smoke may be built up and maintained for the balance of the cure. If the fish are to be kept for 2 weeks, they should be smoked for 24 hours, or for a longer time. Smoking may require 5 days or even more. Hard-smoked or red herring may require 3 or 4 weeks.

Keep the fire low and steady; if hardwood sawdust is not available, use chips and bark; they serve almost as well. The fire must not be allowed to die out at night. Do not build it up before leaving, as this will create too much heat. It must be tended regularly during the night.

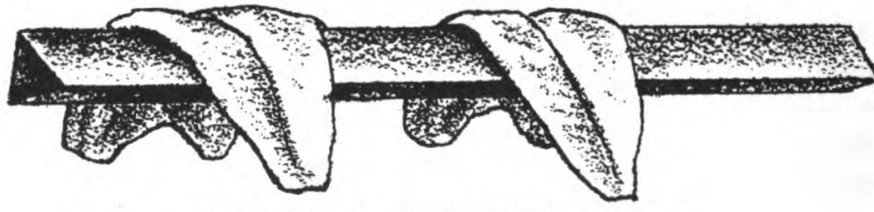


FIG. 200. Hanging fillets for smoking.

Here is the best way to smoke fillets. Any white-fleshed, "lean" fish will produce fillets weighing more than 1 pound which are satisfactory for smoking. Cut the fish into fillets, removing the backbone and skin. Cover with a 90° brine (saturated salt solution) and hold for 2 hours. Remove and drain for 10 to 15 minutes and air-dry for 2 hours. Hang across a three-sided smokestick, each side about 3 inches in width. Smoke over a fire with a fairly light smoke for 4 hours at a temperature not higher than 90°F. Turn the fillets so that the side resting on the smokestick is uppermost and smoke 4 hours longer. Smother the fire so that a dense cloud of smoke is

produced, and smoke until the fillets are a deep straw yellow, turning the fillets once or twice so that both sides will be evenly colored. This operation should take about 6 hours.

Testing Smoked Meat

When the warm meat is removed from the smokehouse it should be tested for spoilage. Sourness and putrefaction can often be detected at this time, and often a taint will be noticeable a week or two after smoking. However, most of the meat that has safely passed through all the processes of curing and smoking may be considered sound.

The instrument used to test smoked meats is called a "ham trier." It resembles an old-fashioned ice pick or a harness awl. A 10-inch skewer or brochette will serve the purpose, or a length of stiff wire pointed at one end. This gadget is run along the bone to the center of the ham from both hock and loin ends. In withdrawing the trier, smell it. If the odor is sweet and pleasant, the meat is sound. If, however, the trier carries an unpleasant sour odor, the piece should be cut open and examined carefully for spoilage. If there is a definite odor of putrefaction it is best to destroy the entire piece. Shoulders are tried in the shank, at the shoulder point, and under the blade bone.

Storing Cured and Smoked Meat

Cured smoked meats are an important part of the home food supply; consequently it is essential to protect and store them properly so they are in the best condition for future use.

The objects sought in storing are protection from insects, control of molds, and the prevention of excessive drying and rancidity. Excessive humidity and lack of ventilation are conducive to molding. Rancidity is attributable mainly to light. Lack of protection permits insect infestation.

After the smoked meat has cooled, it is ready to be wrapped and stored. At this time, farmers, in particular, rub ground black pepper mixed with a little red pepper on the meat to add flavor. The meat is then well wrapped in parchment paper and put into muslin bags. The paper wrapping should be heavy enough to keep the fat from soaking the bottom of the bag. The top of the bag should be folded over and tied securely, a loop for hanging the meat being made in the outside tie string. Do not hang the meat by the string that is fastened to the meat as insects may enter the package along this

string. As a further protection against insects, the U. S. Department of Agriculture recommends painting each bag or sack with yellow wash before storing for future use. In preparing the yellow wash for 100 pounds of hams or bacon, use the following: 3 pounds of barium sulphate, 1¼ ounces yellow ocher, 1 ounce of glue (dry), and 6 ounces of flour.

Fill a pail half full of water and mix in the flour, breaking up all the lumps thoroughly. Mix the ocher in a quart of water in a separate vessel, add the glue, and pour them into the flour-and-water mixture. Bring this mixture to a boil and add the barium sulphate slowly, stirring constantly. Make the wash the day before it is required. Stir it frequently while using it and apply it with a brush. Lime, clay, flour, or a similar substance mixed with water to a rather thick consistency may also be used to paint the bags.

The date for killing, curing, and smoking should be planned, if possible, so that the smoked meat can be bagged or put in an insect-proof place before the flies appear in the spring. Careful watch should be kept for insect infestation throughout the storage period.

If the meat has been properly cured and smoked, it should store satisfactorily in a dry, dark, cool, well-ventilated place. Hams and shoulders stored in this manner will keep a year or longer. Storing cured smoked meats, especially hams, for long periods also develops a product that has unique characteristics and is highly regarded for its culinary value. During this period significant changes take place, which develop a most pleasurable taste sensation. With the exception of a few special kinds, such as Virginia and Westphalia hams which are improved by one or two years' keeping, the best ham and bacon, other things being equal, are those which are freshest cured and smoked.

Generally, mold will appear on "naked" or unwrapped hams and bacons; it is not a sign of poor quality or deterioration. In humid climates, mold may develop very rapidly on the meat but usually can be rubbed or trimmed off without serious loss. A light mold may be easily removed by rubbing with a cloth slightly moistened with sweet oil and lard. This application is sometimes desirable even when no mold appears, as it tends to prevent mold formation and gives the meat a bright, fresh appearance. Meat should be watched closely for evidence of mold penetration into the pieces. Once the mold works in between the muscles it injures the flavor.

The shrinkage of dry-cured hams and shoulders just after being smoked will range from 8 to 15 per cent of the fresh weight. Brine-cured hams and shoulders will shrink from 3 to 8 per cent. The shrinkage of either may run from 15 to 30 per cent at the end of several months' storage.

Bacon does not store as well as hams and shoulders and is usually most appetizing when freshly cured and smoked.

Home Canning

Since ancient times foods have been preserved by various methods, such as drying, salting, and smoking; but it was not until early in the nineteenth century that canning was developed. Although canning principles are fundamentally the same for all foods, the methods and equipment employed must be suited to each type if a safe and satisfactory pack is to be obtained.

Canning is one of the most satisfactory methods yet developed for the preservation of perishable foods. Canning prevents the development of bacteria within the food and contamination from without.

Beef, veal, lamb, pork, poultry, and fish may be canned successfully in the home provided they are processed according to approved methods. Choice cuts may be canned in a number of ways to preserve their identities and to add variety to the canned meat products. It is possible to can steaks, roasts, chops, ground beef, sausage, spareribs, dried beef, and liver, as well as meat for stews, meat pies, and other dishes. Canning chicken, beef, pork, rabbit, and other home produced meats gives the family a greater variety of meat during the year. Canned meat on the shelf is a real help when company arrives unexpectedly, and a good timesaver for busy days.

Turkey, squab, other poultry, and small game should be canned like chicken. Can veal, lamb, mutton, and large game animals like beef.

All meat for canning should be handled in a strictly sanitary manner and completely chilled before cutting and canning.

Frozen meat may be canned, but it does not make a high-quality product. If meat has become frozen, do not thaw it before canning. Cut or saw the meat into uniform strips 1 to 2 inches thick and plunge at once into boiling water. Simmer until the color of raw meat has almost disappeared, then pack and process.

Utensils and Equipment. Meat may be canned successfully in the home only if it is processed under steam pressure. This means that the meat must be processed in a steam-pressure canner to insure perfect safety. It requires a temperature of 240°F. for effective sterilization; and this high temperature, which can be obtained only under steam pressure, is absolutely essential for canning meats safely. "If a steam pressure canner is not available," says the U. S. Department of Agriculture, "other methods of preservation should be used for meats." Complete instructions for canning meats come with each pressure canner and one should become thoroughly familiar with

all the canning-machine working parts and all the specific directions and cautions.

Be sure to have every utensil and piece of equipment perfectly clean. Leave everything thoroughly clean after the day's work. The best utensils for meat canning are of enamelware, aluminum, re-tinned metal, stainless metal, and porcelain. Copper or iron utensils may discolor meat, and meat allowed to remain in galvanized iron containers for more than 30 minutes may absorb harmful quantities of zinc.

Cutting boards and table tops where meat has rested must be scrupulously clean. They need special treatment to keep bacteria under control, so scrape them, scrub with hot soapy water, and rinse with boiling water. Then disinfect, using a hypochlorite solution or a chloride-of-lime bleaching fluid diluted according to directions on the can. Let this stay on about half an hour; then wash off with scalding water. Do not let meat lie on linoleum. The cloths used should be rinsed with cool water to remove meat juices. They should then be washed in soapy hot water and boiled. Rinse in the same kind of disinfectant you use for wood.

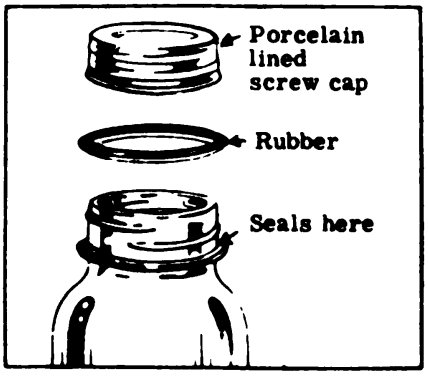
Containers for Canned Meats. Either tins or wide-top glass jars may be used in canning meats, but they must be of the type that can be sealed airtight to prevent the entrance or development of bacteria, yeasts, and molds.

If tin cans are used, be sure you have a sealer in good working order. It should be properly adjusted. To test it put a little water into a can, seal it, then submerge the can in hot water for a few minutes. If air bubbles rise from around the lid of the can, the seam is not tight, and the sealer needs further adjusting.

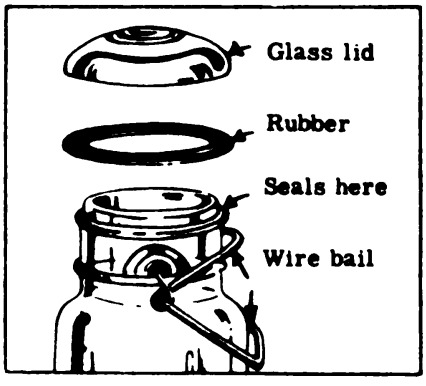
Use only plain tin cans for meat, preferably with paper gaskets. The sizes generally preferred are No. 2, which holds 2½ cups (20 ounces); No. 2½, 3½ cups (28 ounces); No. 3, about 4 cups (33 ounces).

Glass jars should be those made especially for canning, because others may not withstand the heat or the processing period. It is important that the glass jars be in good condition, with no nicked or chipped edges to prevent proper seal. New lids and jar rubbers should always be used in meat canning—the exception being the glass tops.

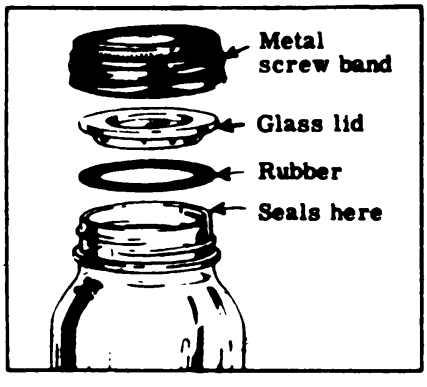
There are four main types of glass jars suitable for preserving meat. These glass containers and how to manipulate them when canning and after canning are illustrated and described by the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, in the following manner:



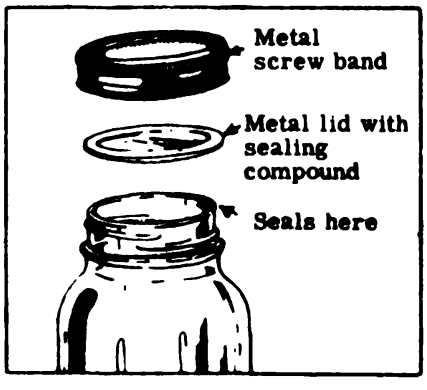
Before filling the jar, fit a wet rubber ring down on the jar shoulder. Do not stretch more than needed. Fill jar. Partially seal by screwing lid down firmly tight and turning it back 1/4 inch. At the end of the processing period remove the jar from the water bath or pressure cooker and immediately screw the lid down tight to complete the seal.



Before filling the jar, fit the wet rubber ring on the jar. Fill jar. Put on glass lid. Partially seal by pushing the long wire bail over top of lid, so it fits into groove. Leave short wire bail up. At the end of the processing period remove jar from the water bath or pressure cooker and immediately push short wire bail down to complete the seal.



Before filling the jar, fit the wet rubber ring on the glass lid. Fill jar. Put lid on with rubber side down. Partially seal by screwing the deep metal band on firmly tight; then turn back a quarter of a turn but make sure it really catches. At the end of the processing period remove jar from the water bath or pressure cooker and immediately screw band down tight. When the jar is cold remove the screw band.



Fill the jar. Dip metal lid in boiling water, place on top of the jar with sealing compound next to the glass. Screw shallow metal band on firmly tight but not hard enough to cut through the compound. At the end of the processing period remove the jar from the pressure cooker or water bath. Do not tighten further unless the band is very loose, then hold the lid firmly while the band is tightened. When the jar is cold remove the screw band.

Number of Glass Jars and Tin Cans Required. It is necessary to know approximately the yield of canned meat from fresh before one can approximate how many glass jars or tin cans will be required to accommodate the meat.

For a quart jar or No. 3 can, allow [1] about—

5 to 5½ pounds of pork loin (untrimmed);
5 to 5½ pounds of beef rump (untrimmed);
3 to 3½ pounds of beef round (untrimmed);
4½ to 5½ pounds of chicken (dressed, undrawn) to be canned with bone;
7 to 8 pounds of chicken (dressed, undrawn) to be canned without bone.

Preparation of Meat for Canning. There are four general ways in which meat may be prepared for canning. It may be packed raw, hot (seared or boiled), cured, or smoked.

Select the loin, roast cuts, steaks, or chops as the large pieces of meat to be canned. The less tender and smaller pieces are best for stew or soup meat.

Trim the meat from the bones. Keep the bones to make broth or soup. Trim away most of the fat without slashing the lean. Remember to cut the larger pieces, with the grain running lengthwise, into pieces that will slip into the glass jars or tin cans. The smaller pieces of stew meat are handled and processed just like the larger pieces.

Raw Pack. Some prefer to salt meat in the canning, others add it later when the meat is being prepared for table. If salt is desired, a level teaspoonful may be put into the clean, empty pint jars or No. 2 cans; ¾ teaspoonful into No. 2½ cans; 1 teaspoonful in quart jars or No. 3 cans.

Pack the containers with the raw, lean meat, leaving about 1 inch above the meat in glass jars; fill tin cans to the top; then set the open jars or cans in a large vessel with warm water about 2 inches below the rim of the jar or the can. Cover the vessel and heat the water at a slow boil until the meat in all the jars or cans is steaming hot and medium done. This requires about 50 minutes in tin cans and 75 minutes in glass jars. When a thermometer placed in the center of the jar or can registers 170°F., the meat is done. Press the meat down into the tin cans ½ inch below the rims and add boiling water, if needed, to fill to the top. Adjust the lids on the glass jars

[1] Adapted from Home and Garden Bulletin No. 6, Home Canning of Meat, U. S. Department of Agriculture, Washington, D. C.

FIG. 201. Canning meat in large pieces. Select cuts commonly used for roasts, steaks, or chops. Trim away most of the fat without unduly slashing the lean. Too much fat makes meat hard to process.

FIG. 202. Cut meat in can-length strips, so that grain of the meat runs the length of the can. Use small pieces and bits to fill space, or use them for stew meat, ground meat, or soup. Fill cans to top with strips of meat.

Fig. 203. Insert thermometer to center of can. Meat is ready when temperature at center of can is 170° F. If no thermometer is available, cook meat until medium done, about 50 minutes.

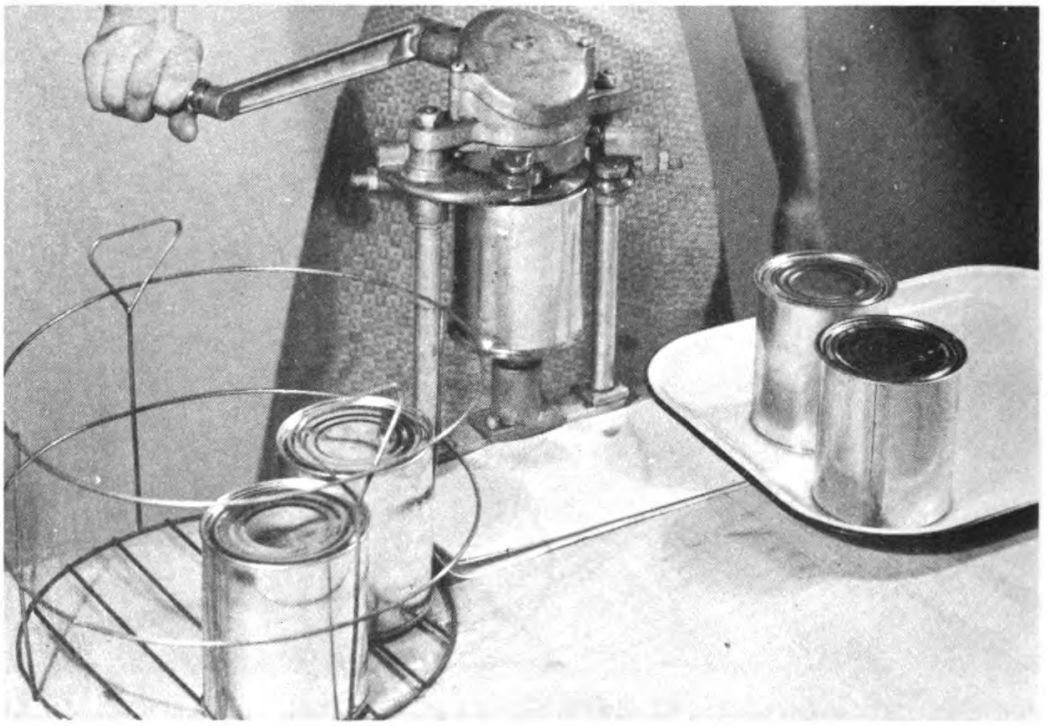


Fig. 204. Seal cans immediately, but follow directions that came with your sealer..

FIG. 205. Remove cans with tongs or thick cloth and cool at once in clean, cold water—preferably running water—until cans are lukewarm.

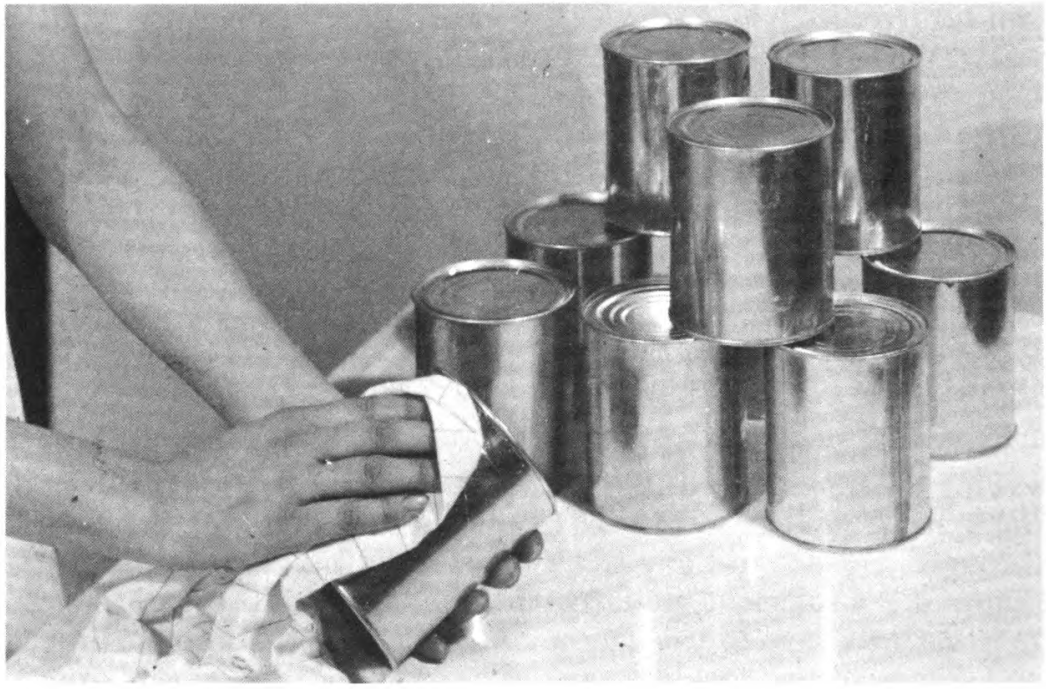


FIG. 206. Dry cans quickly to prevent rust. Stagger them as you stack the cans, to hasten cooling.

(page 249); seal the tin cans. Process at once in the steam-pressure canner at 10 pounds pressure (240°F.)

Pint jars	75 min.	No. 2 cans	65 min.
Quart jars	90 min.	No. 2½ and No. 3 cans	90 min.

Hot Pack. Beef, veal, pork, lamb, and venison may be seared before canning. The time required to sear these meats depends upon their size and thickness. Steaks 2 inches thick will take about 15 minutes; other pieces require more or less time in proportion to their thickness. Roasts, meat loaves, sausage patties, steaks, and chops should be seared without flour until they are light brown on the surface and heated through thoroughly. Floured meat causes a thick, hard crust which retards heat penetration and often gives the meat a charred, inferior flavor. Lamb and mutton should have most of the fat removed and can be seared in bacon drippings, lard, or butter. Care should be taken not to brown the meat too much or burn it. Additional browning can be done when the meat is reheated for serving.

Heat the fat in a roasting pan or skillet and sear meat quickly on all sides to prevent the loss of juice during cooking. Add salt, pepper, and other seasoning to taste. Add boiling water to the fat in the pan. Turn and baste the meat frequently until nicely browned and heated through. Pack the hot meat into the containers solidly. Leave above 1 inch above meat for head space in glass jars; ½ inch in tin cans. Add 2 or 3 tablespoonfuls of liquid from the searing pan. Again leave 1 inch at the top of glass jars for head space; fill tin cans to the top. Work out the air bubbles with a knife and add more liquid, if necessary, to cover the meat. Adjust the lids on glass jars and seal tin cans. Process at once in the steam-pressure cooker at 10 pounds pressure (240°F.)

Pint jars	75 min.	No. 2 cans	65 min.
Quart jars	90 min.	No. 2½ and No. 3 cans	90 min.

Meat may also be boiled before canning. Cut the raw meat into serving portions. Put it into a stew pot and barely cover with boiling water. Simmer for 10 or 15 minutes until completely heated through. Do not use any more water than necessary. All that is required is a sufficient quantity with the meat to fill the containers. It is not necessary to cook the meat tender, as the canning process will complete the cooking.

Pack the meat firmly into the cans and fill up all the spaces between the meat with the liquid in which the meat was boiled. Add seasoning and seal at once. Then process in the steam-pressure canner as previously given for hot pack.

Ground meat may be packed either by the raw or hot process. Small pieces of clean, fresh, cold lean meat can be ground. Do not add any lump of fat in grinding. If desired, add 1 level teaspoon of salt per pound of ground meat and mix thoroughly.

For raw pack, fill the tin cans with the ground meat, level with the top. It is difficult to get the canned ground meat out of glass jars when packed this way. Place the open cans in a large vessel with water about 2 inches below the can rim. Cover the vessel and heat at slow boil until meat in all the cans is steaming hot and medium done. This requires about 75 minutes or until center of the can registers 170°F. Press the meat down into the cans about ½ inch below the rim. Seal the tin cans and process at once in the steam-pressure canner at 10 pounds pressure (240°F.).

No. 2 cans.....100 min.
No. 2½ and No. 3 cans...135 min.

Prepare fresh sausage as directed on page 273, or use any tested sausage recipe, but omit seasoning, except salt and pepper. Sage and other herbs give the meat a bitter taste after processing. Shape the sausage meat into fairly thin cakes that can be packed in the containers without breaking. Put the cakes in a baking pan and precook them in the oven until medium done. Pack hot. Proceed as directed for ground meat, hot packed.

Canning Corned Beef. After corned beef is cured it can be prepared for canning. Wash the meat and cut into pieces suited for packing. Place the pieces of corned beef in a kettle, cover with cold water, and bring slowly to a boil. If the broth tastes very salty, drain and cover the meat with fresh water and parboil again. Pack the pieces of hot meat in glass jars and leave about 1 inch above the meat for head space; ½ inch in tin cans. Cover the meat with the hot broth or hot water, using about ½ to ¾ cup for each quart container. Leave 1 inch for head space in jars and fill the cans to the top. Then work out all the air bubbles with a knife and add more liquid, if needed, to cover the meat. Be sure to leave 1 inch head space in jars and fill cans to the top. Adjust the lids on jars (page 249); seal tin cans. Process at once in the steam-pressure canner at 10 pounds pressure (240°F.).

Pint jars	75 min.	No. 2 cans	65 min.
Quart jars	90 min.	No. 2½ and No. 3 cans	90 min.

Many excellent recipes for canning meats, such as beef-vegetable stew, pork and beans with sauce, baked beans with pork, and many

others including soup stock, are given in *Home and Garden Bulletin No. 6,* Home Canning of Meat, U. S. Department of Agriculture, Washington, D. C.

Poultry. Chicken, turkey, and other domestic and wild fowl, as as well as rabbit, squirrel, muskrat, and ground hog, are all canned successfully at home. Canning provides a good way to use the cockerels and nonlaying hens, as well as stewing chickens. The directions for killing and plucking fowl have been given previously in Chapter XI. The plucked bird is washed and wiped immediately with a damp cloth. Do not soak it in water. Instead of drawing the bird, cut away the edible portions from the carcass.

With a sharp knife, cut off the wings and the legs at the joint next to the body. Pulling on the wing or the leg while cutting will aid in disjointing the bird. Turn the bird on its side and make a cut beginning at the end of the breastbone along the side on a line with the ends of the ribs. Do not make the cut so deep as to cut into the body cavity and puncture the entrails. Turn the bird over and cut the other side in a similar manner. Now lay the bird on its back and break the backbone. Cut around the vent and remove the entrails. Save the giblets. Carefully remove the gall bladder from the liver without breaking it or the meat will get contaminated and taste bitter. Remove lungs and kidneys, also cut out the oil sack in the tail head. Discard these with the entrails. To remove the breast meat from the bone, cut straight down between the wishbone and the point of breast. Leave the meat attached to the breastbone. Now remove the breast meat from the center bone by cutting down the side of the breast. Leave the bone in the other meaty pieces. Cut the legs into drumsticks and second joints. Saw or chop drumsticks off short, if desired. As you cut, trim off the large lumps of fat. Sort the pieces into three piles—meaty pieces, bony pieces, and giblets. The bony pieces are used to make broth which will be needed later. Cover these pieces with water and simmer until the meat is tender.

Drain broth into a bowl and skim off the fat. Remove the meat from the bones and, if desired, can as little pieces.

Hot Pack With Bone. Place the pieces of chicken to be canned in a cooking pan and pour the hot broth or hot water over the meat. The liquid should almost cover it. Cover the pot with a lid and precook the meat. Stir or shake the pot occasionally so the meat will heat and cook evenly. Cook until the meat is medium done, or when cut, shows no pink color at the center of the pieces.

If salt is desired, put level measure into clean empty containers: ½ teaspoonful in pint jar or No. 2 can; ¾ teaspoonful in No. 2½ can; 1 teaspoonful in quart jar or No. 3 can. Pack the second joints and drumsticks with the skin next to the glass or tin. Fit the breast meat into the center and the smaller pieces in vacant spaces where needed. Leave about 1 inch above the meat for head space in the glass jars and ½ inch in the tin cans. Cover the meat with the hot broth and leave 1 inch for head space in the jars and fill the tin cans to the top. Work out all the air bubbles with a knife and then add more liquid to cover the meat if necessary. Be sure to leave 1-inch head space in the jars and fill the tin cans to the top. Now adjust the lids on the glass jars (page 249) and seal the tin cans. Process at once in the steam pressure canner at 10 pounds pressure (240°F.).

Pint jars	65 min.	No. 2 cans	55 min.
Quart jars	75 min.	No. 2½ and No. 3 cans	75 min.

Hot Pack Without Bone. The procedure for this process is practically the same as for hot-packed poultry with bone, except the bone is removed and the skin is left with the meat. Boning can be done while the meat is raw or after precooking. Boned poultry requires longer processing in the steam-pressure canner than poultry with bone. Process bone poultry at 10 pounds pressure (240°F.).

Pint jars	75 min.	No. 2 cans	65 min.
Quart jars	90 min.	No. 2½ and No. 3 cans	90 min.

Raw Pack, With Bone. Bone the fowl in the same manner as directed for hot pack with bone. If salt is desired, use the quantity of salt recommended; also pack the pieces of meat in the containers in the same way. Now set the open jars or cans in a large vessel containing warm water about 2 inches below the tops of the containers. Cover the vessel and heat at a slow boil until the meat in all the containers is steaming hot and medium done. This requires about 50 minutes in tin cans and 75 minutes in glass jars. If you have a thermometer, place it in the center of the container, and when it registers 170°F. the meat is heated sufficiently. Adjust the lids on the glass jars (page 249) and seal the tin cans. Process at once in the steam-pressure canner at 10 pounds pressure (240°F.).

Pint jars	65 min.	No. 2 cans	55 min.
Quart jars	75 min.	No. 2½ and No. 3 cans	75 min.

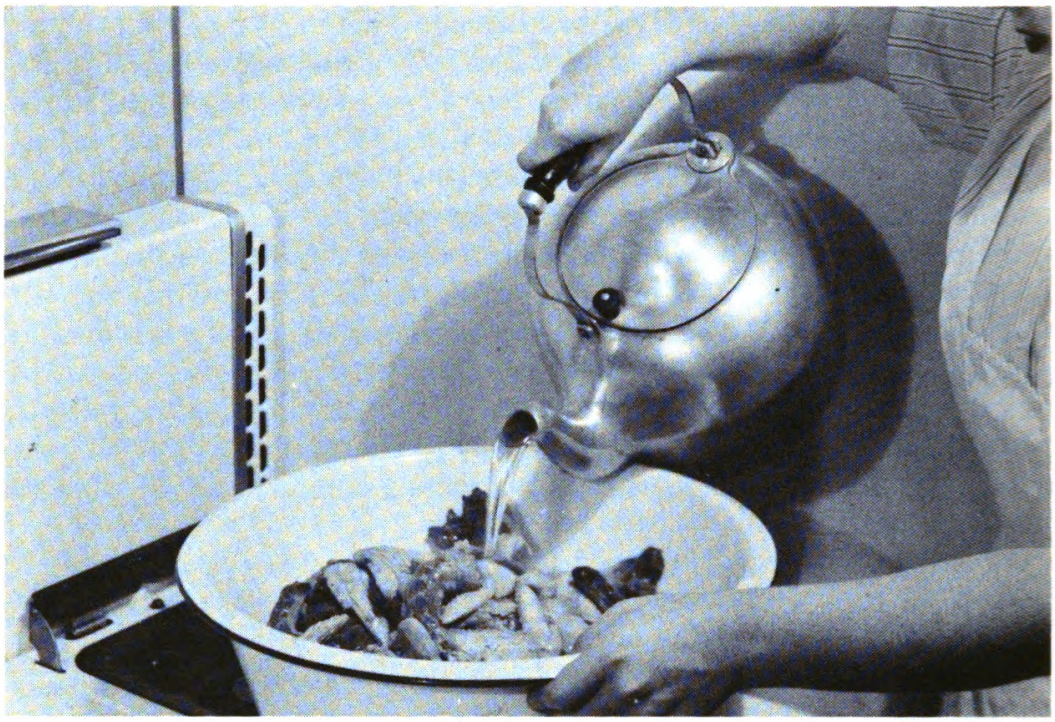


FIG. 207. Pour hot broth or hot water over the pieces of raw chicken in a cooking pan, almost covering them.

FIG. 208. Pack second joints and drumsticks with skin next to glass; breast in center of jar; smaller pieces fitted in.

FIG. 209. Put on glass lid so groove on top is at right angles to bail. Push long wire bail over lid into groove. Leave short wire loose. Work quickly.

FIG. 210. Return each jar into canner as soon as it is filled and sealed. Be sure that the proper amount of water is in the canner so it will not boil dry and be damaged. Fasten lid securely.

Raw Pack, Without Bone. Proceed as directed for raw-packed poultry with bone, but remove the bone and leave the skin with the meat. Pack the pieces. Boned chicken requires longer processing in the steam-pressure canner than chicken with bone, so process at 10 pounds pressure (240°F.).

Pint jars	75 min.	No. 2 cans	65 min.
Quart jars	90 min.	No. 2½ and No. 3 cans	90 min.

Giblets. Giblets, livers, hearts, and gizzards can be canned successfully, but it is good practice to can the livers separately. In this way the taste will be preserved more perfectly. Gizzards and hearts may be canned together. Chicken giblets with white turnips, chicken liver sauté, *en brochette,* chicken liver omelet, giblet soup, giblet stew, and giblet pie are only a few tasty and unusual dishes, not to mention dressings and gravies that can be made from these tasty by-products.

Clean the giblets thoroughly and wash them well in cold water. Put them in a cooking pot and cover with chicken broth or hot water. Cover the pot with a lid and precook the giblets until medium done. Shake the pot or stir frequently while cooking. If salt is desired, put level measure into clean, empty containers. In the average family, giblets are canned in such small quantities that only pint jars and No. 2 cans are considered. Here again, if salt is desired, put a level measure into the clean empty containers: 1 teaspoon in a pint jar or No. 2 can. Pack the giblets hot and leave about 1 inch above the meat in the glass jars for head space and ½ inch in the tin cans. Cover the giblets with hot broth or hot water. Leave 1 inch for head space in jars and fill the tin cans to the top. Adjust the lids on the glass jars (page 249) and seal the tin cans. Then process in the steam-pressure canner at 10 pounds pressure (240°F.).

Pint jars	75 min.	No. 2 cans	65 min.

Small Game. Wild rabbits constitute the largest, cheapest, and most generally available supply of game in the United States. More of them are taken each season by hunters and trappers than any other species of game, large or small.

Abundant most everywhere, shot for sport or market, and free from nonsale restrictions in many states, they form an important item of food supply. Squirrels are one of the most widely hunted of the smaller game animals. Rabbit and squirrel meat, if properly prepared, is truly delicious. Woodchuck is also good eating, believe

it or not, as is opossum and raccoon. All this game meat, including quail and pheasant can be prepared and canned the same way as chicken, with or without bone.[1]

Fishery Products. There is an ever-increasing number of homemakers who find it advantageous to can seafoods. The information given here is for the guidance of all who desire to can such foods in the home. Methods that are simple, practical, and safe have been developed for the more important varieties of seafoods that are suitable for canning. Only by adhering to these methods and applying uniform workmanship will the homemaker bring forth a product that will be welcomed at the family table.

The equipment necessary is practically the same as that required for canning meats. Here, again, it must be emphasized that under no circumstances should any fishery product be canned unless a pressure canner is used. It is impossible to process thoroughly by any other means. Keep in mind also that the temperature-pressure-time relationships recommended for processing each product must be adhered to if a safe and satisfactory product is to be obtained.

A wide-mouth jar with a short neck, 1 pint capacity, is best for most fishery products. The type with a glass top that fits down on a rubber ring and is sealed with a wire clamp is satisfactory. There is always a chance of some breakage occurring with the glass tops. Jars of the self- or vacuum-sealing type, fitted with enameled metal tops edged with an inner composition gasket, are regarded as preferable to all other types. They are somewhat more expensive because the caps are not reusable.

Tin cans are used extensively for home canning of fishery products, especially on the Pacific Coast. Best results are obtained if such products are packed in plain tin cans. Enamel-lined cans are not satisfactory. Cans have some disadvantages in comparison with glass jars, but they also have points in their favor. Glass jars cost more than tin cans, but the jars can be used over and over. The reuse of tin cans is dangerous and should not be practiced. In continuous service, therefore, the jars will prove the more economical. The advantages of tin cans are that the product cannot be light-struck, as may happen with glass jars. Cans are lighter than glass jars and easier to handle, and there is no danger of breakage. Final choice depends upon the individual. Perhaps a large quantity of glass jars are on hand, if so, it would not be economical to purchase a supply of cans. If, however, no containers are on hand and the

[1] *Cooking Wild Game,* by Frank G. Ashbrook and Edna N. Sater, Orange Judd Publishing Company, New York, N. Y.

plan is to pack large quantities, then the relative merits of the two types of containers should be considered carefully before making a selection.

Machines are required for sealing the covers on tin cans after they are exhausted and put into the pressure-canner. These sealers for home use are adjustable to various size cans.

The cans recommended for packing fish products at home vary from half-flat to the No. 2 can. The larger sizes are not suitable for home canning. Information on the various sizes of tin cans suitable for home canning of fishery products are given in the following table:

SPECIFICATIONS OF, AND USES FOR, THE VARIOUS SIZES OF STANDARD CANS [1]

Common designation	Can size	Can makers' designation	Dimensions (inches)	Capacity (fl. oz.) [2]	Contents (cups)	Recommended use
Half-flat ..	No. ½	307 x 202½	3 7/16 x 2 5/32	9	1	Minced clams and tuna-style packs
Eastern oyster ...	No. 1	211 x 400	2 11/16 x 4	11	1⅓	
Tall salmon	No. 1 tall	301 x 411	3 1/16 x 4 11/16	17	2	
Pint	No. 2	307 x 409	3 7/16 x 4 9/16	21	2½	

[1] Adapted from *Conservation Bulletin 28,* Home Canning of Fishery Products, U. S. Department of the Interior, Washington, D. C.

[2] The capacity as given indicates the approximate contents in terms of fluid ounces and is not a recommended fill.

PROCURING RAW FISH

Studies by the Fish and Wildlife Service, U. S. Department of the Interior, indicate that fish purchased at average wholesale prices make the cost of home-canned products higher than those canned commercially. A saving is made only when the raw material is brought in by the members of the family and no outlay of money is involved, or when it is obtained at prices well below wholesale. Surplus catches of noncommercial fishermen are one of the best sources of raw material for the home canner. Only the freshest of fish should be canned.

How to handle, transport, inspect, dress and wash fish for preservation have been discussed in Chapter XII and previously in this chapter.

Even if the fish are cleaned when caught, they still require further cleaning and washing before canning. Naturally the fins must be removed, the fish scraped free of scales and slime, the heads and tails cut off, and any remaining bits of viscera or membranes cleaned from the cavity. After the fish have been thoroughly washed in fresh water, the color of the flesh usually can be improved by soaking 15 to 60 minutes in a light brine, made in the proportion of one-half cup of salt to 1 gallon of water. This drains diffused blood out of the flesh. Use only water of drinking quality in canning fish.

How to Pack the Container

Some fish are packed raw, with no preparation other than cutting into container-length pieces. Others are precooked for a short time before they are packed. Precooking removes excess moisture, thus making the canned product firmer, makes packing easier, helps to create a vacuum, and eliminates the exhausting. The time required for processing is also shortened. Containers should be prepared as previously directed under the various discussions of glass jars and cans.

Raw-packed fish should be put into the containers flush with the rim. The shrinkage occurring during processing will create sufficient head space. If space is left below the rim, the space in the processed can will be excessive and the container will be underfilled. This will permit the contents to break up and become mushy when moved. For precooked fish, the head space allowed is $\frac{3}{16}$ of an inch from the top.

Precooked fish packed into tin cans when hot and sealed immediately, need not be exhausted, because the shrinkage of the product in cooling creates sufficient vacuum. Exhaust before sealing is necessary only for cold-filled, raw-pack, or precooked fishery products in tin containers. Products packed in glass, however, need not be put through an exhaust process. Exhaust will occur during processing, because the containers are not then completely sealed.

After the tin cans are exhausted and before they are put into the pressure canner the covers must be sealed on the cans. The principle of operation is the same as that for meat canning, and the directions that accompany the can-closing machine should be carefully and completely followed. This also applies to the steam-pressure canner instructions on processing in both glass and tin containers.

All containers must be cooled as rapidly as practicable after processing; otherwise the stored-up heat will continue the cooking and the contents will be over-cooked. Plunge the tin cans into cold

Labeling. Label each glass jar and tin can that has passed inspection so that you will know the contents and date. If more than one lot of food has been canned during the day, add a lot number.

To fasten paper labels on tin, use rubber cement; or if the labels are long enough, put glue along one end and wrap the label smoothly around the can and lap the glued end over the other. Occasionally, a tin can packed too full will bulge at the ends after processing has been completed. Such a can should be marked to distinguish it from one that may bulge later because of food spoilage.

FIG. 211. Label plainly each good glass jar or tin can so you will know the contents and date. If more than one lot was canned in a day, add the lot number.

Storing. Canned food should be stored in a cool place, as heat will increase the loss of color, flavor, and food value, and may cause flat-sour or other kinds of spoilage. Make sure the canned food will not be kept warm by a chimney, hot pipes, or a stove. It should be stored in a dry place, as dampness may cause rusting of lids and favors mold growth. Light causes food to fade and lose quality, so glass jars should be protected from light. Freezing softens food. But unless the freezing cracks the jars or breaks the seal the product will continue to keep.

A good sturdy shelf, with ample space, should be provided for home canned foods. A good plan is to build the shelves so that the jars are only two deep and can be handled easily. The jars and cans can be arranged on the shelf in the order in which they are to be used. This will simplify the planning of meals and distribute the use of the canned food through the year.

Most canned fishery products require 2 or 3 months in storage to ripen properly; that is, to allow sufficient time for complete absorption of the salt and other seasoning substances.

Using Home Canned Food. Before opening any jar or tin can, examine it thoroughly. Bulging covers or rubber rings, gas bubbles, or leakage evident on a glass jar may indicate spoilage. Press the end of the tin can. Neither end should bulge or snap back, unless the can was sprung when processed. Both ends should look flat and curved slightly inward. Seams should be tight and clean, with no sign of leaks.

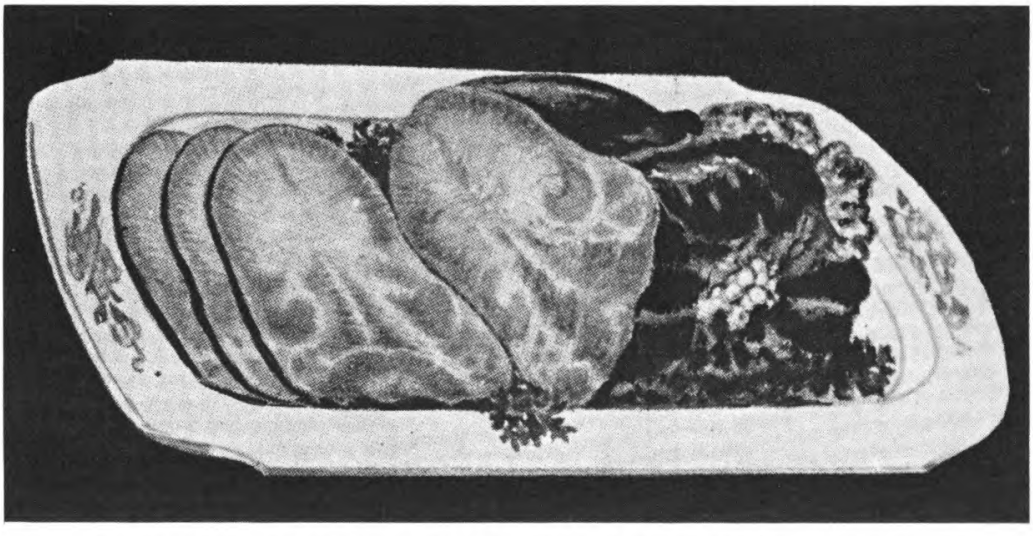


FIG. 212. Cured tongue slightly smoked is a popular cold cut.

When you open a jar or tin can there should be no outburst or sucking in of air or sputtering of liquid. Always smell the food as soon as the jar is opened. The odor should be characteristic of the product. Note any off-odor and look carefully for any signs of off-color, mold, or softening of the meat. These are signs of spoilage. A tin can should be smooth and clean inside and show very little corrosion. If a metal cap of a jar or tin can has turned dark inside, this is not harmful. The sulphur from the meat caused this. The broth over the meat may or may not be jellied. If it is liquid, this is not a sign of spoilage.

It is possible for meat to contain botulinus poison without showing it, but it can usually be identified by a bad odor when the meat is heated. So as a safety precaution before tasting, turn out the meat into a pan, add a little water if needed, cover the pan and boil twenty minutes before adding any other ingredients. If any meat smells queer after this, destroy it without tasting. Spoiled meat and fish should be burned to eliminate the possibility of it being eaten by chickens and animals. If the meat is good and not to be used at once after it has been boiled, chill it immediately in a refrigerator.

XIV

MEAT PRODUCTS AND BY-PRODUCTS

Because there are so many kinds of meat and so many ways to prepare it, we can have just as much variety as we want.

Aside from the standard cuts there are heads, tails, feet, hocks, trimmings, internal organs, blood, and fat that can be utilized in making sausages, puddings, scrapple, headcheese, pickled pigs' feet, pickled and smoked tongue, dried beef, and meat loaf. Many of these products require no further cooking, for they can be served as cold cuts. Others must be grilled, fried, or boiled before they are served.

Commercially in the large packing houses these products are made exclusively of trimmings, scraps, and hard-to-sell irregular cuts of meat and other parts of the carcass not included in the standard cuts.

When the family's meat supply is prepared at home, certain primary whole cuts can be used efficaciously and, with care and attention, the result is a choicer meat delicacy instead of a means of using scraps. Many of these easy-to-make specialties require very little preparation.

Sausages and Puddings

To most people the term "sausage" means ground pork. Really it means any ground or chopped meat. Technically, sausage is a mixture of minced meat or meats seasoned, spiced, and stuffed into casings which originally consisted of the intestines of hogs, sheep, or cattle—sheep being most tender. The stuffed casing is tied shut usually at short intervals to form a string of plump cylindrical sections with rounded ends. Some kinds are used fresh and can be prepared for the table by grilling, frying, and boiling. Other sausages, not classed as fresh meat, are boiled, smoked, or boiled

and smoked, or air dried. Some of these can be eaten as cold cuts without any further preparation, while others require further cooking to make them palatable.

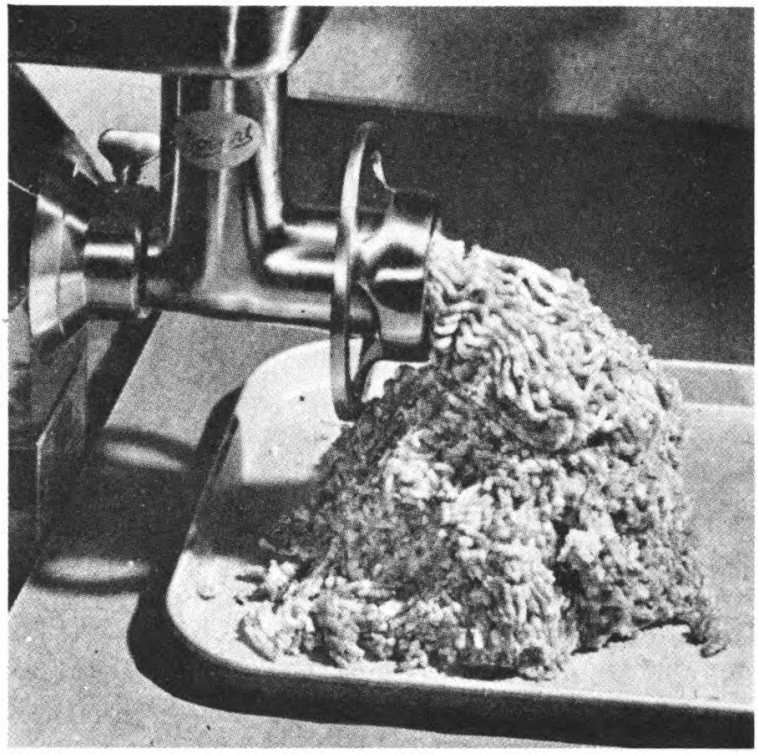


FIG. 213. Meat should be cold when it is ground. Cleancut meat assures fine texture.

Pudding is a variety of sausage also made of spiced, minced meats and edible entrails mixed with cereal, blood, milk, suet, shredded onions, eggs, breadcrumbs, and other ingredients. The mixture is stuffed into a casing, tied shut at both ends, and boiled directly after it is made. The puddings are then kept in a cool place and, before serving, they may be boiled again or grilled.

Pudding making had its greatest modern development in England, Scotland, and France. *Boudins* or *boudins noir,* or black puddings as they are called in England and in some parts of Scotland, are made of hogs' blood, shredded suet, dried oatmeal, and minced onions with plenty of pepper and salt added. Seasoning varies in different localities. In some sections of England, coriander and caraway are preferred; in others, majoram and thyme. In France, beetroot and garlic are favorites; in Spain, fennel; in Germany, thyme and majoram; whereas sage is a predominate favorite in the United States.

Strange as it may seem, sausages and puddings are age-old meat products, dating back to the time of the ancient Greeks. As long ago as the fifth century B.C., Aristophanes makes an allusion in his comedy *The Clouds,* "Let them make sausages of me and serve me up to the students." And then later, A.D. 288, in the oldest cookbook that has come down to us *Diepnosophists,* Athenaeus says, "Epicharmus mentions sausages, calling them oryae, a name by which he even entitles one of his plays the Orya."

Hundreds of years later in Europe we find the highest peak of development and appreciation of sausage and pudding making. Originally these meat products were made to preserve fresh meat, and salt and spices were added. Historically, Germany, Austria, Italy, Czechoslovakia, and other European countries vied with one another in their various varieties of sausages.

The Germans have been among the largest consumers of sausage and have developed many kinds, the names of which often end in *wurst,* meaning sausage. Thus we have wienerwurst, liverwurst, bockwurst, and mettwurst.

The delicious flavor of sausage appeals to the entire family alike; consequently sausage has grown in popularity. Because of its palatability and economy, sausage is a popular item in our diet, and its use in our country is increasing. Of all meats produced commercially, about one pound in eight is eaten as sausage. In 1952, we consumed 1½ billion pounds of federally inspected sausage.

Preparing Sausage. Sausage of superior quality is one of the most palatable of pork products. Good sausage is indeed a wholesome food and is easy to make. Whether you make a few pounds or many pounds, your sausage will always be appetizing if you exercise a little patience and follow carefully the directions given here.

There are many kinds of sausage varying according to the kind of meat or combination of meats used; whether cooked or uncooked; fresh or cured; the character and combination of spices and herbs; whether or not cereals have been added; the style of casing; whether natural or artificial; or where cloth is used, with or without a paraffin covering.

Fresh sausages are made from fresh, uncured meat. They are not precooked and usually not smoked; consequently their keeping qualities are no better than those of ground fresh meat. Pork sausage, either in bulk or in link stuffed into casings, is the most popular fresh sausage. Smoked-pork sausage, bockwurst, bratwurst, and fresh thuringer are other types. Fresh sausages comprise only a small percentage of the total amount of sausages consumed. Fresh sausages are cooked before eating.

Cooked sausages are made of meat that has been given a light cure or marinade before grinding and chopping. Such sausages are cooked and usually smoked. Their keeping qualities are much better than fresh sausages. The frankfurter, also known as the wiener or "hot dog," is the most popular of the cooked sausages. These are cooked and smoked—also cooked before serving. Bologna sausage is quite similar and is a close second in popularity. Braunschweiger liverwurst is also stuffed into casings and cooked and smoked. Both these sausages are sliced and eaten as cold cuts.

Dry or "summer" sausages, such as salami and cervelat, are not generally made in the home, because in many sections of the country the humidity is excessively high and the sausage does not dry out. Therefore, it is likely to be green in the center when cut because it is not thoroughly dried before smoking.

Good sausage makers prefer to use the shoulders, loins, hams, and the bacon strips along with the pork trimmings. Sausage, however, is usually made from the pork trimmings alone. In order to produce sausage that will keep and be of good quality, it is necessary to use fresh meat that is in good condition, this also applies to sausages that require the meat to be cured. Be sure to use only the meat that has been thoroughly cooled and in good condition, free from soiled or bloody portions. Only materials of superior quality should be used. This is also true of the spices, herbs, and other ingredients used in making sausages.

Trim all of the meat from the bones and then trim out all the gristle and blood clots. Cold meat makes trimming easier. Now cut the meat into strips and then into small cubes. Cut both the fat and lean in this manner, but keep them separate. The next step is to weigh the fat and lean meat separately. Then mix together in the proportion called for in the sausage recipe. After the meat is weighed, the general practice is to mix the fat and lean together in the proportion specified and apply the seasoning for the total amount of meat. Then mix the seasoning and meat together before grinding. As the meat is ground, the seasoning will be thoroughly mixed and blended with it. The meat should be cold when it is ground, for this makes the nicest sausage.

A good sausage grinder with stuffer spout and equipped with four plates, having ¾-; ⅜-; 3/16-; and ⅛-inch holes, certainly facilitates making sausage. With this equipment you have a choice, when grinding, of coarse- or fine-cut sausage. Most people prefer coarsely ground to finely ground meat in loose or bulk sausage. This pertains chiefly to an all-pork sausage or a pork-and-beef combination

when it is used for patties or molded and sliced for cooking. If the meat is ground too fine, it has a tendency to become hard and dry in cooking. In either case, too much fat causes a large cooking loss; while not enough fat will make the sausage hard, dry, and difficult to brown.

For coarse-cut sausage, use the cutting plate with the standard $\frac{3}{16}$-inch holes and run it through the grinder once. For a fine-cut sausage, run the meat through the grinder twice, the first time using the cutting plate with large $\frac{3}{8}$-inch holes, and the second time using the plate with the standard $\frac{3}{16}$-inch holes. If a still finer cut is desired, a $\frac{1}{8}$-inch hole plate may be used for the second grinding.

If sausage is run through the grinder twice, it should stand overnight in a cool place between the first and second grindings. This will prevent the meat from becoming heated by being ground twice in succession. It will also give the seasoning a chance to permeate the meat and will insure better flavor. Remember that, in cutting meat for sausage, the cutting knife and plate on the grinder must be sharp and the meat cool. A dull knife and plate will crush out the meat juices and result in inferior sausage.

Small quantities of loose or bulk sausage for immediate use may be kept in a crock or jar in the refrigerator or where it is cool. If it is to be kept for a longer period, it should be molded into patties and partially fried. The sausage is then placed in stone crocks and covered with melted lard.

Fresh pork sausage made of beef and pork, or mutton and pork, and headcheese may be used without being stuffed into casings. Nevertheless, these so-called fresh sausages are also stuffed into casings. Sausages similar to liver sausage and Bologna-style sausage should be stuffed into casings.

Pork casings are excellent for stuffing sausage when properly cleaned and handled. For small link sausage, however, use sheep casings. For medium link sausage, use medium sheep casings or narrow hog casings. For large link or country-style sausage, use regular hog casings. Beef casings are too tough to use for sausage. Bundles or sets of salted casings may be purchased from many local butchers. Several types of manufactured casings are also on the market. Animal casings should be soaked for several minutes in warm water and then flushed out immediately before being used. Sausage may also be stuffed in muslin bags. These can be made by stitching strips of muslin to form bags about 2 to $2\frac{1}{2}$ inches in diameter and about 12 to 15 inches long. Muslin casings should be dipped in water and wrung out before they are used. After being chilled, these stuffed bags are usually dipped in paraffin.

In stuffing, first attach the stuffer spout and force enough sausage into it to fill the spout. Now slip the casing over the spout and feed on as much as it will hold. If a muslin casing is used, pull the closed end of the casing up tightly against the end of the stuffing tube. These precautions will prevent the formation of air pockets in the casing.

To stuff sausage efficiently and successfully, the meat specialists of the U. S. Department of Agriculture recommend that the operator support the casing at the end of the stuffer with the first finger of his left hand while he turns the crank with his right hand. Pressing upward with the left forefinger and raising the stuffed casing above the end of the stuffer spout will pack the casing more tightly, thereby eliminating air pockets. Animal casings are cut after the proper-sized ring or length has been stuffed and a new length is then begun.

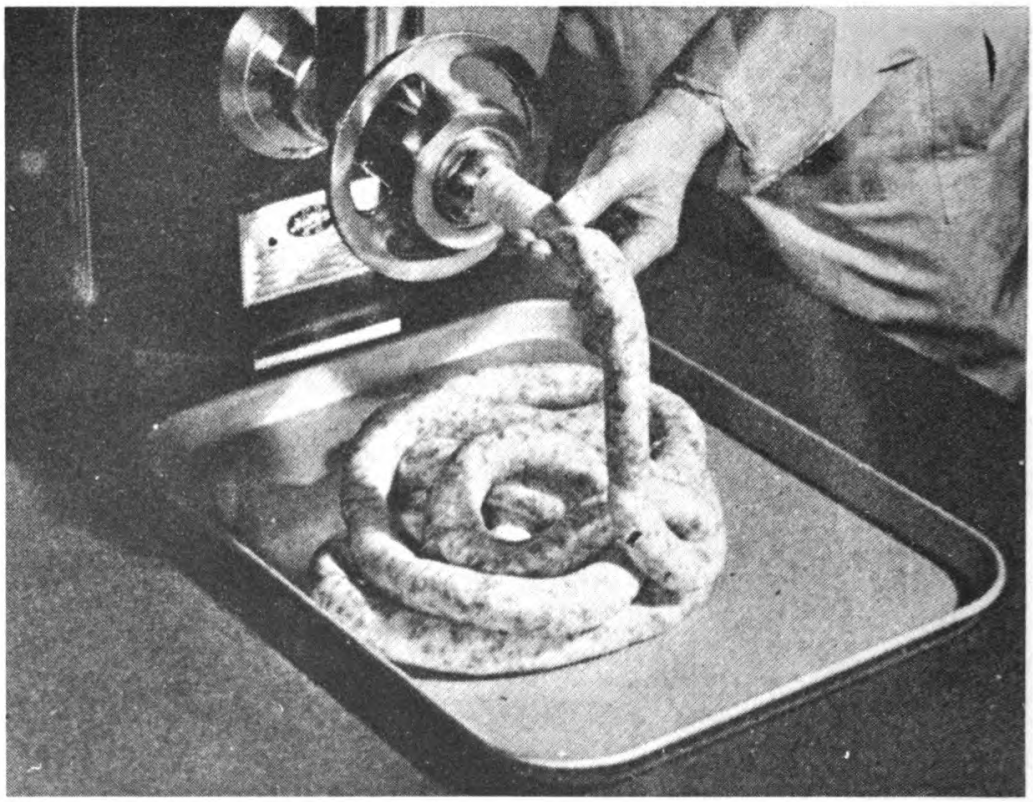


FIG. 214. Force sausage into stuffer spout. Slip casing over the spout and start filling casing; put in as much as it will hold.

To tie the casings, the meat specialists advise driving a tenpenny nail into the far corner of the table and fasten to it one end of a stout, soft, white string 3 feet long. Grasp both cut ends of the cas-

ing, for example, a ring sausage or pudding, in the left hand and tie them together with two half-hitches of the string. Tie the first ring near the nail and each succeeding one a little farther down the string. When the string is full, cut it free and attach a new one.

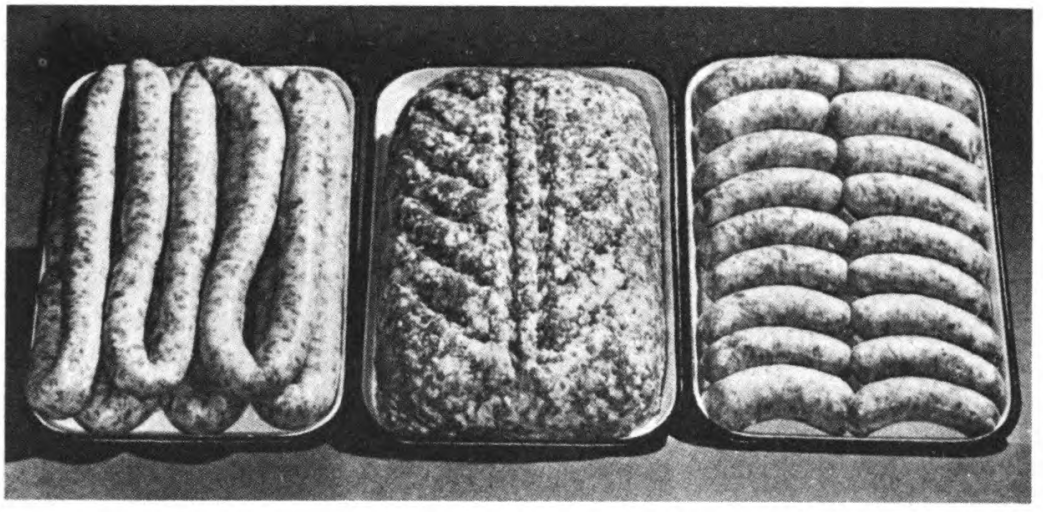


FIG. 215. Some popular varieties of sausage—country style, sausage meat, and breakfast links.

Fresh Pork Sausage

Fresh pork sausage is undoubtedly the favorite in the farm home and is made more often there than in any other home. That is why the all-pork ground-meat product is called "country sausage." It is made of fresh pork about one-third fat and two-thirds lean. More fat will make the sausage too rich and in cooking there will be considerable shrinkage or cooking loss. Less fat will make the sausage rather hard and dry.

For the beginner, it is recommended that a small quantity of sausage be made as a test of the recipe and the family's taste. After all, more or less salt, pepper, or sage may be desired and this can be determined by first experimenting with a small quantity of meat. The following recipe is suggested as a family test.

- 4 pounds pork (⅓ fat and ⅔ lean)
- 5 level teaspoons salt
- 4 level teaspoons ground sage
- 2 level teaspoons ground black pepper
- ½ level teaspoon ground cloves or 1 level teaspoon ground nutmeg
- 1 teaspoon sugar

The meat may have been cut too fine or too coarse. It may be desirable to omit the cloves, the nutmeg, or perhaps the sage; or just omit the cloves and nutmeg and increase the sage. Maybe less salt and pepper are preferable. It is all a matter of taste, and this is essentially a try out.

Fresh seasonings, mixed in the proper proportions, are required to produce a delicious flavor in sausage. The herbs, peppers, and other condiments must have retained a considerable portion of their essential oils in order that their characteristic aromas will permeate the meat. To simplify the seasoning of sausage and insure the same delicious flavor every time, Morton Salt Company has prepared a complete mixture of spices, sage, peppers, and other seasoning ingredients blended with salt in exactly the right proportions to make delicious sausage. This mix is ready to use as you obtain it, and you do not have to add or mix any other ingredients. If you like a well-seasoned sausage or prefer one of mild seasoning you simply use Morton's sausage seasoning as directed.

So, grind, season, and mix your sausage as you like it. That is one of the many advantages derived from preparing meat products at home.

For 100 pounds of pork trimmings and meat one-third fat and two-thirds lean, use the following:

- 1¾ pounds of salt
- 2 to 4 ounces of ground sage
- 2 to 4 ounces of ground black pepper
- ½ to 1 ounce of red pepper
- ½ to 1 ounce ground cloves, or 1 ounce of ground nutmeg

12 ounces of sugar may also be included if the sausage is to be used reasonably soon.

The seasoning should be spread over the mixture of fat and lean meat, and the whole quantity ground as previously described. If the sausage is to be put into casings, it should be stuffed immediately after the last grinding. It should then be soft enough to pack tightly in the casings without the addition of cold water. It may be fried and preserved in lard or canned.

To make bulk sausage that will slice and fry without crumbling, add a half cup of cold water to each 4 pounds of the ground seasoned sausage and knead with the hands until the meat becomes very sticky and dough-like. Pack tightly in small molds or pans and chill thoroughly before slicing.

Smoked Pork Sausage

Use pork sausage made with 2 pounds of salt, instead of 1¾ pounds per 100 pounds of meat. If it is too stiff to stuff properly, add from 3 to 5 per cent of cold water and knead until the mass becomes dough-like. Stuff tightly in casings and allow it to cure for about 24 hours in a cool place. Smoke and dry at a temperature of 70° to 90°F. for a day or two until a dark mahogany color is obtained. The sausage should not be kept until hot weather unless it is canned.

Cured Pork Sausage

The meat is handled in the same manner as for fresh sausage and cut in medium-sized pieces, approximately 2 to 3 inches square. Make the following curing mixture for each 100 pounds of meat.

5 pounds salt (good quality)
1 pound sugar
2 ounces saltpeter

These ingredients should be thoroughly mixed with the meat. Then pack the meat in a crock or other suitable container. Be sure the meat is protected from the air as much as possible. This meat will cure in one or two days and will be ready for further processing. After meat is cured, add pepper, sage, and spice to taste. Additional salt may not be required. Then grind, stuff into sheep or narrow hog casings, and smoke.

Beef, pork, and veal trimmings can be cured in large and small amounts with this same formula.

There are many delicious types and kinds of sausages that can be made with beef, veal, and pork or a combination of these meats with hearts, livers, and tongues. Different combinations of these meats and internal organs are possible, and seasoning and spices may be used to suit the individual taste. Sausages made of various meat combinations may be fresh, cooked, and may or may not be smoked.

Beef and Pork Sausage

A favorite and a very tasty sausage is made of a mixture of beef and pork. Beef is naturally less fatty than pork, so its addition to the mixture not only reduces the shrinkage in cooking but maintains the size of the original sausage. Whether used as a fresh bulk sausage or stuffed into casings, this sausage is most popular with many people. A good proportion to use is 2 pounds of lean beef in combination with 2 pounds of lean pork and 1 pound of fat pork.

Mutton and Pork Sausage

Another tasty sausage is made by mixing two parts of lamb or mutton with one part each of lean and fat pork. The meat is cut in squares, mixed, seasoned, and ground in the same manner as previously given for making sausage.

Game or Hunters Sausage

The less tender portions of deer, antelope, elk, moose, and other big game animals (venison) can certainly be used to best advantage in making a palatable sausage. All these meats can be mixed in the proportion of 2 pounds of venison and 2 pounds each of lean and fat pork.

Smoked Sausage

In some sections of the United States this sausage is also called country sausage. The following ingredients are used in making this delectable product:

85 pounds lean pork
15 pounds beef
1½ to 2 pounds salt
4 ounces black pepper
1 ounce red pepper
1 ounce sweet marjoram
1 ounce mace

Cut all the meat into small pieces and sprinkle the seasoning over it; then run it through the grinder using the small plate. Store the mixture in a cool place for 24 to 36 hours, then add a little water and knead the mixture well. Stuff into hog casings and smoke in a very cool smoke until the sausage takes on a dark mahogany color.

Liver Sausage

This sausage can be made by cooking pig heads, tongues, skins, hearts, and other pieces. Put all the pieces of meat in a kettle, cover with water, and simmer for 2 or 3 hours until the meat can be boned. Do not cook too long or until the meat falls from the bones. Veal or beef can be added and cooked with the pork. Liver contributes a definite flavor to this sausage; 10 to 20 per cent of liver, by weight, is usually added to the other cooked products. Scald the livers last. If they are deeply cut with a knife they should be sufficiently seared in about 10 minutes. Some formulas call for the addition of raw liver.

Grind all the cooked materials moderately fine and add about

one-fifth as much broth by weight, using enough to make the mixture soft but not sloppy. Season to taste and mix thoroughly. The following are standard quantities of seasonings for 100 pounds of the mixture:

2 to 2½ pounds salt
2 to 4 ounces black pepper
1 to 3 ounces sage
¼ to 1 ounce red pepper
1 to 2 ounces allspice

The seasoned, well-mixed sausage is usually stuffed in beef casings and simmered in water until it floats; the time required is 10 to 30 minutes. After being cooked, the sausage is plunged into cold water, chilled for at least 30 minutes, and hung up to drain.

If the meat is cooked too long in the first kettle, the second cooking, after the sausage has been stuffed, will destroy the tight "live" texture of the finished sausage.

Another liver sausage can be made in accordance with the following formula:

35 pounds pork trimmings (heads, shanks, etc.)
15 pounds lean veal or beef
7 pounds dry bread
1 pound salt
2 ounces sweet marjoram
1 ounce allspice
10 pounds meat broth
Garlic or onions

Cook all meat as instructed in previous formula. Separate it from bones and add raw liver and the water-soaked bread from which the surplus water has been squeezed.

The whole mass is then ground through the fine plate. Now add the 10 pounds of meat broth in which the meat was cooked and the rest of the seasoning. Chop the onion or garlic fine. The mass is then thoroughly mixed with the hands or a paddle for about 15 minutes. Stuff into beef casings which have been soaked in warm water.

Liver sausage tied in strings of five or six sausages can be most easily handled. When the sausage is tied, it is cooked in water, not quite boiling, until it floats, then plunged into cold water to cool. This sausage must be kept in a cool place or it may spoil. It is best fried, but it may be cooked in other ways.

Frankfurt or Vienna Sausage

Frankfurt or Vienna-style sausages are more popular with the meat packers and the trade than any other kind. They are also

known as "wienies" and "hot dogs," depending on the size and style of casings used.

The recommended proportions of beef and pork are two parts of lean beef to one part of fat pork. This may be varied to suit individual tastes. The beef may be increased to three parts to one of pork.

20 pounds beef
10 pounds fat pork
4 pounds water
½ or ¾ pound salt
3 ounces black pepper
1½ ounces sage, mace or nutmeg finely ground
Garlic or onions (if desired)

Mix the salt, pepper, and other seasoning together; then thoroughly mix with the cut meat and run through the grinder, using the fine plate. Grind the mixture two or three times to make sure that the seasoning is evenly distributed and that the meat is ground very fine. Add water and mix thoroughly to make a pliable mass. Stuff into sheep or hog casings, depending on whether you want fat or thin frankfurters. After the sausage is stuffed into the casings by means of the thumb and forefinger, press the casing together at about 4-inch intervals. Twist the first link two or three times. The next link made should be twisted in the opposite direction to keep the casing from untwisting. Hang the twisted links in the smokehouse and smoke for about 2 hours at a temperature not to exceed 125°F. or until they are a rich orange color. Then cook in water to 155° until they float. If the water is hotter the casings may burst. The time required for cooking depends upon the thickness of the frankfurters. After cooking, rinse them in hot water, plunge them into cold water, and hang them in a cool place. Frankfurters should be used soon after they are made. If they are to be kept longer, they should be canned.

Bologna Sausage

This is one of our most commonly used sausages. Its name is derived from the town of Bologna in Italy, where it was first made and where the people use it extensively to this day. However, our supply is chiefly of domestic make. There is a comparatively small importation from both Italy and Germany.

Bologna sausage consists of ground pork and beef mixed with enough water to give the sausage the desirable fine, tenacious texture.

The recipe that follows is a good one:

60 pounds beef
40 pounds pork
20 pounds cold water
2 to 2½ pounds salt
1 ounce saltpeter
2 to 4 ounces black pepper
1 to 1½ ounces coriander
1 ounce mace
Onions or garlic (if desired)

Grind the chilled beef trimmings with salt at the rate of 2 pounds per 100 pounds of beef. Use the coarse grinding plate, and allow the meat to cure in a cool place for about 48 hours. Salt, in the same proportion, is added to the coarsely ground pork the next evening and the pork is allowed to cure overnight. Many persons do not cure the pork.

Regrind the cured beef, using the plate with ⅛-inch holes. Then add the pork and grind the mixture again. If the pork was not cured add the salt (13 ounces for each 40 pounds of pork) before grinding. Add the spices and the water and stir or mix vigorously until the whole mass has become sticky. It often takes 30 minutes to mix this sausage properly.

Stuff the sausage tightly into beef casings or muslin bags and allow it to hang and cure in a cool place until the next morning. Put it in a well-ventilated smokehouse heated to 110° to 120°F. Protect the casings from a direct blaze that might scorch them. The sausage should take on a rich mahogany-brown color in about 2 hours.

Put the hot, freshly smoked sausage immediately into water heated to 160° to 175°F., and cook it until it squeaks when the pressure of the thumb and finger on the casing is suddenly released. The usual cooking time for sausage stuffed in beef "rounds" is 15 to 30 minutes. Plunge the cooked sausage into cold water and chill it. Hang it in a cool place to dry. Use as soon as possible.

Summer Sausage

Summer sausage or *cervelat* is similar to salami in preparation. It is made in the country during the winter and kept for use during the summer. As a lunch sausage it has become very popular because of its keeping qualities. Summer sausage is a hard, dry sausage that is highly seasoned. It may be mixed in the following proportions:

35 pounds cured beef
15 pounds fresh pork fat
7 ounces of white pepper
¼–½ ounce coriander
1 ounce whole mustard seed
1 ounce sage
Garlic finely ground if desired

Cure the beef in the same manner and with the same cured meat mixture as that recommended for cured pork sausage. No additional salt is required in the mixture because the cured meat will supply enough. The beef is ground through both the coarse and fine plate of the grinder, but the pork fat is ground only through the coarse plate, preferably two or three times. The ground meat should be seasoned and the pork and beef mixed thoroughly for at least 30 minutes. It should then be spread out on a tray, table, or bench in a cold, dry place and allowed to dry and chill for 1 to 4 days, depending upon the weather. It should be turned once or twice so that all the meat is thoroughly chilled. After it has been allowed to cool and dry, it should be stuffed tightly in beef straights, or beef intestines, and then hung up to dry for about two more days to give the seasoning a chance to act on the meat.

In smoking summer sausage, be careful not to allow the temperature to go above 70°F. In other words, the sausage should be smoked with cold smoke. This requires 36 to 48 hours of continuous fire. A large piece of wood with a knot in it will smoke all night.

The sausage should be kept in a cool, ventilated place. A little mold will improve the sausage, but if it spreads all over the casing, it is harmful because it will give the sausage a moldy taste. If it begins to get too moldy, rub off the mold with a cloth dipped in a mixture of salt and lard.

Salami, a favorite in Italy, Hungary, and Germany, and to a considerable extent in this country is a large sausage made of about two-thirds of lean pork, coarse-chopped, and one-third lean beef, finely chopped, moistened with red wine (or grape juice), flavored with garlic and various spices, stuffed into beef casings, and air dried. Hung in a suitable place it will keep for years.

Goose Liver Sausage

Domestic goose liver sausage undoubtedly stems from *pâté de foie gras,* the principal form developed in France. In Strasbourg and Toulouse, geese are fed to enlarge their livers. These livers are cooked, seasoned with wine and aromatics, and, with cut truffles added, are filled into earthenware "terrines" and surrounded and covered with a forcemeat made of liver trimmings and pork. In the best grades the livers are whole; the lesser qualities are of cut pieces. The finest is made from fresh goose livers. It should always be served very cold.

Domestic goose liver sausage, put up in cans of cylindrical shape, consists of the liver cut up in small pieces. Pistachio nuts and pieces

of truffle are added, and the whole is mixed with liver trimmings and pork and forced into casings and cooked. If made of goose livers exclusively, the product then compares favorably with the imported *pâté de foie gras.*

It is surprising to know that most of our domestic goose liver sausage contains very little goose liver, if any at all. Generally, it is made of the parboiled livers from all our four-footed domestic animals, roast pork, and spices. It may or may not contain thin slices of goose liver. This mixture is stuffed into hog casings.

Some folks make a very fair goose liver sausage by using the wings, necks, backs, and giblets. All of these are cooked until they are tender or until the meat falls from the bones. Cooked hog liver is also added to the goose meat.

8 pounds cooked goose meat
2 pounds cooked hog liver
Salt, black pepper, red pepper, and allspice to taste
Goose broth

Grind all ingredients together through the fine plate. Add some of the liquid in which the goose meat was cooked. Then add seasoning and mix thoroughly.

Stuff into casings and simmer in hot water until they float, which requires from 15 to 30 minutes. After cooking, plunge into cold water and chill thoroughly. This sausage may be eaten as fresh liver sausage or it can be smoked. A light smoke greatly improves the flavor.

Another good formula for this sausage is the following:

50 pounds lean pork necks cured
50 pounds goose livers
1½ pounds salt
8 ounces sugar
1 ounce saltpeter
3 ounces white pepper
1 ounce nutmeg
1 ounce marjoram
½ ounce ground cloves
16 ounces finely chopped pistachio nuts or truffles

Grind pork and goose livers through fine plate of grinder. Add all other ingredients and mix thoroughly. Stuff in medium-wide hog bungs or beef middle casings. Cook for about 1 hour at 155°F. Cool the sausage and allow it to dry overnight. Smoke it the next day in a warm smokehouse.

Other Meat Products

In addition to sausages, numerous other meat products can be made (with pork the principal ingredient) to furnish a means of

utilizing the edible parts of cuts difficult to bone, such as head, feet, and tail. Cooking is a convenient means of preparing these parts and of utilizing miscellaneous pieces of trimmings, liver, heart, tongue, and the broth in which the meat has been cooked. All the meat should be well trimmed and washed before being cooked. Hog and calf heads should be split and cleaned thoroughly, removing the eyes, eardrums, and nasal passages, and chopping off the teeth. Pig jowls are usually cut off and cured as previously described. It is better not to cook the jowls with the other meat in making headcheese and scrapple, because it will make these products too fat.

The feet should be well shaved, cleaned, and the glandular tissue between the toes trimmed out. The toes and dewclaws should have been removed when the carcass was dressed. They may be included with the meat cooked for headcheese and scrapple or they may be prepared separately as pickled pigs' feet.

Beef trimmings are frequently mixed with the pork, principally because the product with pork added is more desirable than when made solely from beef trimmings.

Headcheese

Headcheese is easily made. Make deep cuts in the thick pieces of meat, cover with water, and simmer until the meat is well done and slips from the bones. The skin, if used, should be cooked in a sack so that it may be removed from the pot when so tender that a finger can be pushed through it. The thick ears and snouts will require longer cooking than the other skin. The skin is ground with the plate having ⅛-inch holes. The other pieces of meat are boned after they are cooked. These, with the boneless pieces such as the heart, are ground with the plate that has ½-inch holes. Some persons prefer to cut the tongue and some of the larger pieces of fat into strips instead of grinding them. Others prefer not to grind any of the meat but pick or cut it in pieces.

The meat, whether part of it is ground and some cut or all picked to pieces, is then mixed with enough of the broth—the water in which the meat was cooked—to make the mass soft without being sloppy. This mixture is returned to the kettle and brought to a boil. This reheating serves to mix the gelatin thoroughly through the broth so that when the headcheese is poured into shallow pans and chilled it will slice without crumbling.

Seasoning is added at the beginning of the second cooking. Usually it is safe to season to taste, though the following quantities of

seasoning per 100 pounds of cooked meat, including the added broth, are a satisfactory guide:

2 to 2½ pounds salt	1 ounce ground cloves
3 to 5 ounces black pepper	1 ounce coriander
¼ to 1 ounce red pepper	2 ounces sweet marjoram

More piquancy to the flavor can be obtained by adding one or two bay leaves, some cut or chopped parsley, and minced onion fried tender but not brown. A little vinegar or lemon juice or minced lemon rind also gives a desirable flavor.

If the headcheese is stuffed into casings, this should be done after seasoning and before the second cooking. The stuffed headcheese should then be placed in the remaining liquid and simmered until it floats (10 to 30 minutes). Then take it out, chill and hang away. Headcheese is usually sliced and eaten cold.

Headcheese is usually made from pork, but some beef or veal may be added in the following proportions:

20 pounds pork	¼ ounce allspice
5 pounds beef	¼ ounce cloves
¼ pound pepper	½ ounce caraway
½ pound salt	4 pounds broth

The meat is cooked as previously described. It is cut up by hand into half- or quarter-inch cubes. Then the broth in which the meat was cooked is added with the seasoning, and the mass is thoroughly mixed by hand until the seasoning is properly worked through the meat. This mixture is then put into casings (hog paunches or beef straights) and laid out to cool. They may be pressed by laying a weighted board over them.

Scrapple Recipes

Scrapple or ponhaws originated with the Germans who settled in the eastern part of the key-stone State. They came to be known as Pennsylvania Dutch instead of Pennsylvania Deutsch. The old-fashioned formula for ponhaws they developed calls for young pig's head boiled until the meat is readily separated from the bones. The meat is then chopped or ground very fine and put back into the broth (the water in which the meat was cooked) and then thickened with buckwheat or cornmeal, and seasoned with spices and herbs. When of the consistence of mush, it is run into pans to cool, to be later sliced and fried for the table.

There are numerous formulas or recipes for making scrapple.

Therefore, at this juncture it is pertinent to clarify just what is the accepted idea of ponhaws and scrapple. In the process of time, inferior recipes have lowered the general conception of ponhaws and today scrapple made by the best recipes stands for what originally was ponhaws. Not only have the fine basic recipes for ponhaws been corrupted but the term as well; for example—panhas and pon house.

Most of the scrapple sold in the stores and served in the restaurants today is for the most part nothing more than a glorified mush, flavored with a trace of pork liquor, and seasoned with over-aged spices and herbs.

Ponhaws

Here is a most delicious ponhaws of old Pennsylvania vintage in which pork plays a prominent part.

Clean a pig's head thoroughly (page 80), split it, and remove the brains, tongue, and eyes. The tongue may or may not be included with the meat to be cooked. Put the head pieces and tongue, if desired, into a large kettle, cover with 4 or 5 quarts of cold water and simmer gently for 2 or 3 hours, or until the meat falls from the bones. After the meat is cooked, let it stand a while until the fat collects on the surface. Skim off this grease carefully; remove meat and chop fine. Strain the broth to remove all bones and gristle. Hold out a little broth to mix with cereal later. Return the remainder of the liquid to the kettle, put in the chopped meat, and bring the mixture to a boil. Add the finely ground yellow cornmeal, moistened with some of the cooled broth, so that it may be added to the hot mixture of meat and broth without forming lumps. Boil slowly for about one-half hour, stirring almost constantly to prevent sticking and scorching. Just a few minutes before cooking is completed or when the mixture attains the consistency of soft mush, add one teaspoon of powdered sage, salt, and pepper; stir in well. Pour the hot scrapple into small, shallow, greased pans and chill as promptly as possible. Later, when it molds, the scrapple can be sliced and fried to a crisp brown. If properly made it will not separate when sliced nor crumble when fried. The slices may be floured before they are fried.

Scrapple

The scrapple of general consumption, an especially favored breakfast dish, is made chiefly of cornmeal, pigs' feet, tails, skin, and all trimmings not used for sausage. The high standard of meat products

is largely determined by the quality of meat and other ingredients that enter into their making, as well as the correct proportion of each.

Cook the heads, tongue, hearts, and trimmings all together until the bones and much of the gristle can be removed. If skin is included, cook until tender. Skin and gristle, no matter how long they are cooked, will not contribute much quality to the meat portion of the mixture or to the finished product. However, these two items will enrich the broth in which it is cooked. Pour off the liquid through a strainer and remove all bones and large portions of gristle. A small portion of skin may be left with the meat. Grind all this material through the fine plate. Pour all the broth in which the meat was cooked back into the kettle and then add all the ground meat.

The cereal to be added may be only finely ground yellow cornmeal or a cereal mixture, one consisting of 7 parts cornmeal and 3 parts of white or buckwheat flour; or 7 parts cornmeal, 2 parts shorts, and 1 part of buckwheat flour.

Four parts ground-meat products with a low content of gristle and skin, 3 parts of meat broth, and 1 part dry cereal or cereal mixture (by weight) will produce a richly flavored and generally satisfactory scrapple. More meal and broth may be used if desired. The same is true of the meat.

In adding the cereal or cereal mixture, moisten it with some of the cooled broth so that it may be added to the hot ground-meat and broth without forming lumps. Boil the mixture for about one-half hour, stirring it frequently or constantly to prevent sticking. Add the seasoning shortly before the cooking is finished and stir it well.

Salt, pepper, and a few or many spices may be added depending upon the preference of the individual. The following seasonings may be used for 100 pounds of scrapple, including the meat broth and the dry cereal mixture:

2 to 2½ pounds of salt
2 to 4 ounces black pepper
2 to 4 ounces sweet marjoram
2 to 4 ounces sage (if desired)
1 ounce red pepper (if desired)
1 ounce nutmeg (if desired)
½ ounce of mace (if desired)
2 ounces of ground onions during second cooking (if desired)

When the scrapple is cooked it is poured into small shallow pans and chilled as promptly as possible.

Scrapple

Select 3 pounds of bony pieces of pork. Simmer in 3 quarts of water until the meat drops from the bone. Strain off the broth, remove the bone, taking care to get all of the tiny pieces, and chop the meat fine. There should be about 2 quarts of broth, and if necessary add water to make this quantity. Bring the broth to the boiling point, slowly add 2 cups of cornmeal, cook the mixture until it is thick mush, and stir almost constantly. Add the chopped meat, salt, and any other seasoning desired, such as onion juice, sage, and thyme. Pour the hot scrapple into oblong enamelware pans which have been rinsed with cold water. Let stand until cold and firm, slice, and brown in a hot skillet. If the scrapple is rich with fat, no more fat is needed for frying.

Oatmeal Scrapple

Cook a pork bone, on which there is still some meat, until it falls from the bone. Steam a cupful of oatmeal in the meat broth. Clean the bone of all pork and run it through the meat grinder. Add to it the cooked oatmeal until it attains the consistency of soft mush. Season with sage, or other herbs, salt, and pepper. Pour into shallow pans and let stand until stiff and cold. Slice and fry to a crisp brown.

Turkey Scrapple

Here is a good way to use some of the left-over roast turkey:

4 cups turkey meat
4 cups celery stuffing
1 teaspoon salt
1 teaspoon poultry dressing
1½ cups cornmeal
Turkey bones
Giblet gravy

Chop together in a chopping bowl the meat and stuffing. Break the turkey bones, cover with cold water and boil slowly 45 minutes. Strain and pick all meat off the bones. There should be about 12 cups of liquid. Add meat and stuffing, gravy, salt, and poultry dressing. Put into a large kettle over a slow fire and gradually add the cornmeal, stirring constantly. When very thick pour into well-buttered bread pans to cool and harden. This will keep for a month in a cool place. Slice as desired and fry in butter to a crisp brown.

Mincemeat

Originally mincemeat was a mixture of finely chopped or minced meat, suet, fresh and dried fruits, and nuts, citron, molasses, sugar, spices, and brandy and other spirituous liquor, or cider. Today, not only is the spirituous liquor omitted but frequently the meat and suet also, leaving a mixture chiefly of fruits, molasses or sugar, and spices.

To be sure, the good grades of commercially prepared mincemeat are very convenient, but the person who is seeking the full-bodied richness, which is so characteristic of the genuine article, must either begin from scratch to make it or supplement the commercial product.

This Thanksgiving and Christmas necessity, as originally made in many sections of the United States, contained a portion of venison, rabbit, beef, or veal. It may or may not have been the tougher portions of the carcass. Tongues of deer, antelope, elk, calves, and cattle are also used to make mincemeat and some of the oldtimers claim that tongue makes a more delicate product than the muscle meat.

Here are the ingredients for an excellent mincemeat:

- 5 pounds boiled beef or tongues
- 2½ pounds suet
- 2 pounds raisins
- 1 pound raisins (seeded)
- 2 pounds currants
- ½ pound citron (cut or chopped fine)
- ½ pound candied orange peel (cut fine)
- ½ pound candied lemon peel (cut fine)
- 6 pounds chopped peeled apples
- 1 tablespoon cinnamon
- 1 tablespoon allspice
- 1 tablespoon cloves
- 1 tablespoon nutmeg
- 1 tablespoon salt
- ½ pound almonds (grated or chopped)
- 4 pounds sugar
- Rind and juice or 4 oranges and 4 lemons
- Brandy and whiskey

Cook the meat. After it is cool, chop or cut very fine, add sugar, raisins, currants, citron. Mix these ingredients together. Chop or cut apples fine but do not mash them, and add to chopped meat. Add spices and mix thoroughly. Pour over the mixture one quart of brandy and two quarts of whiskey; add rind, and juice of oranges and lemons.

Put mixture into an earthen crock with a lid. Place a cloth over

the top and then put on the lid. Keep in a cool place for about three weeks. Then add more salt and spices if taste requires this. Let stand for about 4 weeks before using. At this time it can be packed in glass fruit jars. When making mincemeat pies, always bake this filling between two crusts.

Mincemeat (Small Portion)

Here is a formula for making a small portion of mincemeat (about 3 cups):

- 1 cup coarsely chopped beef
- ¼ cup chopped suet
- ½ cup raisins
- ½ cup currants
- ½ cup citron (chopped)
- 2 cups apples (chopped)
- 1 cup cider or apple juice
- Juice and grated rind from 1 lemon
- 1 cup brown sugar, firmly packed
- 1 teaspoon salt
- 1 teaspoon cinnamon
- 1 teaspoon allspice
- 1½ teaspoons brandy

Put all the ingredients except the brandy in a saucepan. Cook slowly for about 1 hour and 15 minutes. Stir in brandy after the cooked mincemeat has cooled.

Deer Mincemeat

The following is a formula that can be used with any venison—deer, elk, or antelope, also rabbit and bear meat.

- 2 pounds cooked venison chopped or ground
- 4 pounds chopped apple (not mashed)
- 4 cups sugar brown or white
- ¾ pound chopped suet
- 2 pounds raisins
- 1½ teaspoons cinnamon
- ½ teaspoon nutmeg
- ½ teaspoon cloves
- ½ teaspoon mace
- 2 teaspoons salt

Mix all the ingredients together. Add enough cider to cover mixture. If cider is not available, use fruit juices or water with ½ cup of vinegar. Sweet fruit juices reduce the amount of sugar required. Cook very slowly until the fruits are tender (about 1 hour). This mincemeat will keep indefinitely if put in fruit jars.

Deer Mincemeat, Canadian Method

5 pounds of deer meat
5 pounds of unpeeled apples
2 pounds of seedless raisins
2 pounds currants
1 cup molasses
1 cup candied citron
1 tablespoon cinnamon
1 tablespoon allspice
1 teaspoon cloves (more or less, according to taste)
2 cups tarragon vinegar
5 pounds granulated sugar
1 pound beef or deer suet
1 cup chopped lemons
1 cup chopped orange peel
Salt to taste and a pinch of black pepper
½ cup of good brandy

Cover the deer meat with cold water, add a *bouquet garni* made of 10 sprigs of parsley, 10 sprigs of green celery leaves, 2 large bay leaves, and one large or two small sprigs of thyme, tied together with kitchen thread, and cook until tender; the time of cooking depends upon the age of the deer, but the meat should be ready to fall from the bones when done. Then remove the bones and put the meat through a food chopper (using a coarse blade) together with all the remaining ingredients. Put the entire mixture in a large kettle with enough of the broth in which the meat was cooked barely to cover, and cook for 1 hour over a medium flame, stirring occasionally. Pack while still hot in hot, sterilized quart jars, and before sealing pour over each jar 1 generous tablespoon fine brandy. Store in a cool, dry, dark place until wanted.

Rendering Lard

Good homemade lard, the rendered fat from the hog, is one of the choicest fats the housewife can use. The leaf fat, back fat, and fat trimmings are usually rendered together. The caul and ruffle fats from the offal yield a darker product and should be rendered separately. This fat which is obtained from the internal organs (killing fat) promptly chilled makes fair lard, but many prefer to use it as soap stock.

All the lean meat should be trimmed out of the fat before it is rendered. If lean meat remains in the fat it drops to the bottom of the kettle and is likely to scorch and discolor the lard.

Fat will render more rapidly and yield a higher percentage of lard if it is cut into small pieces of uniform size. It is not necessary to remove the skin, but many persons prefer to remove it and then run the pieces of fat through the coarse plate of the sausage grinder.

This is a good practice for home rendering where small kettles are used. The lard will render more quickly, yield more, and it will not be necessary to use a lard press for the cracklings.

Be sure that the pieces of fat are clean. Place the fat, cut into pieces or ground, in a cool and thoroughly cleaned kettle. Do not fill the kettle too full or the lard may boil over and catch fire.

Cooking should be very slow until the fat has begun to melt and it can be stirred freely in the kettle. Then a moderately hot fire may be applied so that the rendering process is not too slow. The fat should be stirred frequently during the entire cooking process to prevent the crackling from sticking or scorching.

As the rendering progresses, the crackling will turn light brown and float. This is an indication that it is soon time to remove the kettle from the fire. Lift some of the cracklings from the fat and, if they are dry and crisp, the lard is rendered. However, when they are more completely rendered they gradually sink to the bottom of the kettle. Many persons stop cooking the fat when the cracklings are still floating. The more complete rendering, however, removes a greater proportion of the moisture, thus producing lard that will keep better.

Allow the rendered lard to settle and cool slightly. Then dip the lard out of the kettle and strain through a double thickness of cheesecloth into containers which have been thoroughly cleaned. If the fat has been cut into small pieces or cubes, the cracklings should be run through the lard press and strained.

Finer-grained lard may be obtained by cooling quickly. Slowly cooled lard tends to separate and become quite granular in texture. Stirring the lard slowly while cooling makes it whiter, more uniform in texture, and finer-grained, but the lard will not keep as long as if it were not stirred. A method often used to whiten lard is to put a potato in long enough to absorb some of the impurities.

Exposure to air and light help to develop rancidity in lard. For this reason the containers should be filled as nearly full as possible, sealed and stored in a dark, cool place. Lard should not be covered tightly until it is thoroughly cooled. If the moisture has been eliminated from the lard by a thorough rendering no water-souring should develop during storage.

Light, air, and moisture coming in contact with lard start deterioration. So, avoid digging down into your lard supply if it is packed into large cans. Scrape off from the top surface the amount you require, keeping the main body of lard level in the container. Once lard has become rancid it is impossible to bring it back.

Preserving Meat in Lard

Good lard has so many uses, it is so digestible, and forms a foundation for so many tasty dishes that it pays to render and store it with extreme care. It is also a satisfactory preservative for meat if only fresh meat is used and if precautions are taken to keep everything clean and sterile.

Cook meat as you would cook it for serving. Place it in a dry, sterilized crock and cover immediately with hot lard. Cover with clean wax paper and place on this a crock cover or plate. Store in a cool, dry place. Do not keep meat packed in lard during hot weather unless the storage place is always cold.

When meat is removed from the crock, be sure to pack down the remaining meat and cover it again with melted lard so that no air will reach it. It is better to store this meat in small crocks than in large ones, for then it will not be disturbed so often.

Roast pork, pork chops, pork steaks, and sausage patties can be cooked and preserved in lard.

Soap Making

Waste lard or fat from cooking and fats rendered from tallow and meat trimmings may be used in making soap at home. The quality of the soap obtained depends on the kind and condition of the fat. A combination of tallow and lard makes the best soap. Poultry fat and vegetable oils should be combined with other fats, as soap made from them alone is soft and spongy. Waste fat should be clarified.

To clarify waste fat, melt it slowly and strain it through two thicknesses of cheesecloth. Then add an equal volume of hot water, stir well, and bring to a boil. Remove from the fire, and with constant stirring, add one quart of cold water. Set aside to cool. When firm, the clean fat on top is ready to make into soap.

The other materials combined with fat to make soap are borax, lye, and water. The addition of borax is not necessary. It is sometimes used, however, to improve the appearance and suds of the soap.

Lye can be obtained in grocery stores. Care should be taken in dissolving it in water as the fumes are irritating and heat is generated. Avoid contact of the dry lye or the lye solution with the skin or clothing. If this occurs, wash well with water and rinse with diluted vinegar. Lye attacks aluminum. Therefore, never use aluminum utensils in making soap.

Soft water (rain water) is best for making soap. If hard water must be used, add 1 to 2 tablespoons of lye per gallon, depending on the hardness of the water, and let it stand for 2 days until the hardness settles out.

Equipment. Enamel, iron, or earthenware containers must be used for dissolving the lye and for mixing the soap ingredients. Never use aluminum. Stir with a wooden paddle or with a wooden or enamel spoon. A dairy thermometer is convenient for measuring temperatures.

Molds for the soap may be made from cardboard or wooden boxes or shallow enamel pans. The soap is more easily removed if the mold is lined with waxed paper or with cotton cloth dipped in cold water and wrung dry.

Soap Formulas

To make about 9 pounds of soap the following is recommended:

6 pounds of clean fat (about 13 cups)	1 can lye (13 ounces)
¼ cup borax (optional)	2½ pints soft water

To make one bar of soap use the following:

1 cup clean fat	5 teaspoons lye
1 teaspoon borax (optional)	½ cup soft water

Procedure. Weigh or measure the clarified fat, heat slowly until completely melted, and cool to approximately 110°F. (slightly higher than blood heat). If borax is desired, it should be added to the fat at this point. Stir the fat occasionally during cooling to prevent crystals from forming. Meanwhile, dissolve the lye in the water and cool to about 85°F. (lukewarm). Pour the lye solution into the fat in a thin, steady stream with slow, even stirring. Continue stirring until a thin honey-like texture is obtained. This should take from 10 to 20 minutes. Always add the lye solution slowly to the fat, this is important. Too rapid addition of the lye or too vigorous stirring may cause separation of the ingredients.

If the soap mixture does not become thick within half an hour and there is a greasy layer on top, perhaps it is too warm. In this case, set the container in cool water and keep stirring from the sides and bottom. On the other hand, if the mixture is lumpy, it may be too cold. Then set it in a pan of warm water and stir until the lumps disappear.

Pour the thickened soap mixture into the prepared molds. Cover and keep warm for at least 24 hours. Remove the soap and cut it

into bars. Before the soap is ready for use, the bars should age for about 2 weeks in a dry place.

If the soap is crumbly or has streaks of grease it may be reclaimed. To do this, cut the soap into fine pieces, add water (7 pints for 9-pound-soap formula, and 1 cup for the 1-bar formula) and dissolve over low heat. Stir occasionally. When the lumps have disappeared, increase the heat and boil until the soap appears thick. Pour into molds.

After proper aging, soap carefully prepared according to the preceding directions makes a good general household product. Homemade soap will sometimes contain enough free alkali to be harmful to the skin; hence it is not generally recommended for toilet use.

XV

HELPFUL REFERENCES

APPENDIX A	Publications of the Department of Agriculture
APPENDIX B	Publications of the Department of the Interior
APPENDIX C	Motion Pictures Produced by the Departments of Agriculture and the Interior
APPENDIX D	Reference Books
APPENDIX E	State Game Departments
APPENDIX F	United States Agricultural Experiment Stations

APPENDIX A

PUBLICATIONS OF THE DEPARTMENT OF AGRICULTURE

The bulletins and leaflets listed below are available for distribution by members of Congress; Office of Information, U. S. Department of Agriculture, Washington 25, D. C.; or by the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Some are for sale only, at the price quoted. For these send order and remittance to the Superintendent of Documents.

FARMERS' BULLETINS

Number	*Title*	*Price*
684	Squab raising	—
697	Duck raising	—
767	Goose raising	—
840	Farm sheep raising for beginners	—
849	Capons and caponizing	—
920	Milk goats	—
1055	Country hides and skins, skinning, curing and marketing	.15
1186	Pork on the farm; killing, curing and canning	—
1334	Home tanning of leather and small fur skins	.15
1377	Marketing poultry	.15
1378	Marketing eggs	.15
1391	The guinea fowl	—
1409	Turkey raising	—
1415	Beef on the farm; slaughtering, cutting and curing	—
1424	Making vinegar in the home and on the farm	.10
1508	Poultry keeping in back yards	—
1524	Farm poultry raising	—
1592	Beef production on the farm	—
1730	Rabbit production	—
1753	Livestock for small farms	—
1807	Lamb and mutton on the farm	—
1815	Grading dressed turkeys	—
1888	Poultry cooking	—
2011	Turkey on the table the year round	—

LEAFLETS

Number	*Title*	*Price*
L 273	Curing pork country style	—
L 279	Chicken in the freezer	—
L 310	U. S. Grades of beef	—
C 706	Meat dehydration	.10
C 731	Composition and nutritive value of pork as related to weights of animals and cuts	.10
C 803	Feathers from domestic and wild fowl	.10
C 886	The lymph glands of cattle, hogs and sheep	.10

Number	*Title*	*Price*
IS 52	Protect home cured meat from insects	——
IS 56	How to choose and use your refrigerator	——
M 687	Home freezers—their selection and use	.10
M 5241	Handling your big game kill	——

BULLETINS

Number	*Title*	*Price*
G 1	Family fare—food, management and recipes	.25
G 6	Home canning of meat	——
G 13	Food for families with school children	——
G 27	Meat for thrifty meals	——
A.H. 8	Composition of foods—raw, processed, prepared	.35
Tech. Bul. No. 926	Estimation of composition of beef carcasses and cuts	——
Tech. Bul. No. 944	Estimation of the composition of lamb carcasses and cuts	.05

Appendix B

Publications of the Department of the Interior

Publications listed with a price quotation can be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Those without a price quotation can be obtained free from the Fish and Wildlife Service, Department of the Interior, Washington 25, D. C.

Number	*Title*	*Price*
1 TKS	Fish cookery for one hundred	.30
2 TKS	Basic fish cookery	.20
3 TKS	How to cook oysters	.10
4 TKS	How to cook salmon	.15
5 TKS	How to cook ocean perch	.10
6 TKS	How to cook shrimp	.15
19 FL	Cooking carp	——
35 FL	Fish cookery in the open	——
36 FL	Food value of fish and shellfish	——
53 FL	Sauces for seafood	——
61 FL	Garfish recipes	——
69 FL	Market and recipes for fresh water turtles	——
90 FL	Nutritive value of canned fishery products	——
106 FL	How to cook fish	——
116 FL	Composition of fish	——
194 FL	Recipes for Pacific rockfish	——
202 FL	Pacific salmon	——
247 FL	Fish for breakfast and why not?	——
269 FL	Cod . . . the beef of the sea	——
275 FL	Fish and Shellfish canapes and hors d'oeuvre	——
295 FL	Chemical composition of some canned fishery products	——
320 FL	Rose-fish cookery	——
18 FL	Home preservation of fishery products (salting, smoking and other methods of curing fish at home)	——

Number	*Title*	*Price*
377 FL	Cosmopolitan fish cookery for the Philippines	——
404 FL	Title fish recipes	——
308 Sep.	King Crab recipes	——
60 FL	Mild curing, pickling, dry salting and smoking salmon	——
122 FL	Smoking lake herring, white fish, lake trout and carp	——
196 FL	Smoked herring	——
270 FL	Electrostatic smoking of sardines	——
312 FL	Smoking shrimp	——
115 FL	Handling fresh fish	——
128 FL	Refrigerated locker storage of fish for home use	——
181 FL	Fish can be stored in refrigerated lockers with other food	——
213 FL	Wrapping materials for frozen fish	——
214 FL	Fish refrigeration	——
229 WL	Recipes for cooking muskrat meat	——
246 WL	Save game meat; it is valuable	——

Appendix C

Motion Pictures Produced by the Departments of Agriculture and the Interior

Motion pictures produced by the U. S. Department of Agriculture are a great help in classroom and cooperative extension work, as they are designed to demonstrate improved methods in agriculture and home economics. These films, as well as the slidefilms, may be procured on a loan basis. Prints of the motion pictures may also be purchased. Agriculture Handbook No. 14, Motion Pictures of the U. S. Department of Agriculture, tells all about the films and how they may be obtained and used to promote a better agriculture. A copy may be obtained from Motion Picture Service, Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

Some of the current films pertaining to this book and related subjects are listed below.

Title

Biology:
- How Animal Life Begins
- In the Beginning
- Ovulation, Fertilization, and Early Development of the Mammalian Egg
- Transplanting Hen's Ova

Curing Meat:
- Curing Pork Country Style
- Pork on the Farm
- Meats With Approval

Livestock:
- Do Unto Animals
- Feeding Farm Animals
- Livestock and Mankind
- Livestock Cooperatives in Action

Nutrition:
- For Health and Happiness
- Kids Must Eat
- Something You Didn't Eat

Poultry:
- Duck Farming
- Poultry—A Billion Dollar Industry
- Producing Quality Poultry

RELATED SLIDEFILMS

Title	
Frozen Food Lockers and Your Food Supply	Cooking Poultry, Older Birds
Canning Chicken	Cooking Poultry, Young Birds
Canning Meat	Home Grown Food: Production Preservation
Cooking Meat According to Cut	Federal Meat Inspection

Motion pictures may be borrowed from the U. S. Fish and Wildlife Service without cost except that of returning the film. Those listed below are of interest in connection with this book.

Title	
Conservation in Action	Pacific Halibut Fishing
Food for Thought	Retailing Fish
Filleting and Packaging Fish	Wildlife of the Aleutian Islands
It's the Maine Sardine	

Address all correspondence about these motion pictures to U. S. Department of the Interior, Fish and Wildlife Service, Box 128, College Park, Maryland.

APPENDIX D

REFERENCE BOOKS

Meat

Title	*Author*	*Publisher*
Meats and Meat Products	William Henry Tomhave	J. B. Lippincott Company, Philadelphia, Pa.
Farm Meats	M. D. Hesler	The Macmillan Company, New York, N. Y.
Meat for the Table	Sleeter Bull	McGraw-Hill Book Company, Inc., New York, N. Y.
The Meat We Eat	P. Thomas Ziegler	The Interstate Printers and Publishers, Danville, Ill.
The Construction and Composition of Foods	Winton and Winton	John Wiley and Sons, Inc., New York, N. Y.
Home Meat Curing Made Easy		Morton Salt Company, Chicago, Ill.
No. 6 Meat—Better Buymanship		Household Finance Corporation, Chicago, Ill.

Cooking

The Pennsylvania Dutch Cook Book	William K. Dorman Leonard Davidow	Dorman and Davidow, P. O. Box 250, Reading, Pa.
Louis Diat's Home Cook Book	Louis Diat	J. B. Lippincott Company, Philadelphia, Pa.
The Boston Cooking-School Cook Book	Fannie Merritt Farmer	Little, Brown and Company, Boston, Mass.

Title	*Author*	*Publisher*
The Alice Bradley Menu-Cook Book	Alice Bradley	The Macmillan Company, New York, N. Y.
Meta Given's Modern Encyclopedia of Cooking	Meta Given	J. G. Ferguson and Associates, Chicago, Ill.
Ida Bailey Allen's Step-by-Step Cook Book	Ida Bailey Allen	Gosset and Dunlop, Inc. New York, N. Y.
Gay Nineties Cook Book	F. Meredith Dietz August Dietz, Jr.	The Dietz Press, Inc., Richmond, Va.
As The World Cooks		International Institute of Lowell, Inc., Lowell, Mass.
Picayune Creole Cook Book		The Times Picayune Publishing Company, New Orleans, La.
Jessie Marie Deboth's Cook Book	Jessie Marie Deboth	Whitman Publishing Company, Racine, Wis.
Shaker Cook Book	Caroline B. Piercy	Crown Publishers, New York, N. Y.
Better Homes and Gardens New Cook Book		Meredith Publishing Company, New York, N. Y.
Six American Home Magazine Cooking Booklets		Doubleday, Page & Company, New York, N. Y.
Hungarian Cooking	Katalin Frank	British Book Center, New York, N. Y.
Clementine in the Kitchen	Phineas Beck	Hastings House Publishers, New York, N. Y.
Specialties de la Maison		American Friends of France, Inc., New York, N. Y.
The Joy of Cooking	Irma S. Rombauer	The Bobbs-Merril Company, New York, N. Y.
The Best from Midwest Kitchens	Ada B. Lothe Breta L. Greim Ethel M. Keating	M. S. Mill Company, Inc., New York, N. Y.
The Garland Cook Book	Laura K. Leonard Ruth W. Crosby	Chester R. Heck, Inc., New York, N. Y.
Fannie Engle's Cook Book	Fannie Engle	Duell, Sloan and Pierce, Inc., New York, N. Y.
The Settlement Cook Book	Lizzie B. Kander	The Settlement Cook Book Company, Milwaukee, Wis.
The Good Housekeeping Cook Book		Rinehart and Company, Inc., New York, N. Y.
Mother Hubbard's Cook Book	Marion White	M. S. Mill Company, Inc., New York, N. Y.
Sunset's Kitchen Cabinet Recipes		Lane Publishing Company, San Francisco, Calif.
American Women's Cook Book	Ruth Berolzheimer	Garden City Publishing Company, Inc., Garden City, N. Y.
The Philadelphia Cook Book of Town and Country	Anna W. Reed	Barrows and Company, Inc., New York, N. Y.
Edith Barber's Cook Book	Edith M. Barber	G. P. Putnam's Sons, New York, N. Y.
America's Cook Book		Charles Scribner's Sons, New York, N. Y.
Ann Batchelder's Own Cook Book	Ann Batchelder	M. Barrows and Company, Inc., New York, N. Y.
The Escoffier Cook Book	A. Escoffier	Crown Publishers, New York, N. Y.
The New American Cook Book	Lily Haxworth Wallace	Books Incorporated, New York, N. Y.
Cook at Home in Chinese	Henry Low	The Macmillan Company, New York, N. Y.
How to Cook and Eat in Chinese	Buwei Yang Chao	The John Day Company, New York, N. Y.
The Epicure in Imperial Russia	Marie Alexandre Markevitch	The Colt Press, San Francisco, Calif.
Guilded Notes on Cookery		Wesleyan Service Guild, Lavonia, Ga.

Title	*Author*	*Publisher*
Tropical Cooking	Gladys R. Grayam	The Panama American Press, Inc., Canal Zone, U.S.A.
Fish and Game Cookery	Roy Wall	M. S. Mill Company, Inc., New York, N. Y.
Cooking Wild Game	Frank G. Ashbrook Edna M. Sater	Orange Judd Publishing Company, New York, N. Y.
Fowl and Game Cookery	James Beard	M. Barrows and Company, Inc., New York, N. Y.
Fish and Game Cook Book	Harry Botsford	Cornell Maritime Press, New York, N. Y.
Fish and Seafood Cook Book	Rose and Bob Brown	J. B. Lippincott Company, Philadelphia, Pa.
Seafood Cookery	Lily Haxworth Wallace	M. Barrows and Company, Inc., New York, N. Y.
Casserole Cookery	Marion and Nino Tracy	Modern Age Books, Inc., New York, N. Y.
Casserole Magic	Lousene Rosseau Brunner	Harper and Brothers, New York, N. Y.
The Outdoorsman's Cook Book	Arthur H. Carhart	The Macmillan Company, New York, N. Y.
A Cook Book of Left-overs	Clare Newman and Bell Wiley	Little, Brown and Company, Boston, Mass.
Short Cuts and Leftovers	Hannah W. Schloss	M. Barrows and Company, Inc., New York, N. Y.
The Kitchen Cook Book	Ruth Taylor	Charles Scribner's Sons, New York, N. Y.
Pressure Cookery	Leone Rutledge Carroll	M. Barrows and Company, Inc., New York, N. Y.
Pressure Cooking	Ida Bailey Allen	Garden City Publishing Company, Inc., Garden City, N. Y.
Herbs for the Kitchen	Irma Goodrich Mozza	Little, Brown and Company, Boston, Mass.
How to Carve Meat, Game and Poultry	M. O. Cullen	McGraw-Hill Book Company, Inc., New York, N. Y.
The Complete Meat Cook Book	Beth Bailey McLean Thora Hegstad Campbell	Chas. A. Bennett Co., Inc., Peoria, Ill.

Appendix E

State Game Departments

Those who desire to preserve and store wild game and fish should contact the State Game Department in the State in which these pursuits are contemplated.

State	*Organization*	*Location*
Alabama	Director, Department of Conservation	Montgomery 4
Alaska	Fish and Wildlife Service	Juneau
Arizona	Director, Arizona Game and Fish Commission	State Bldg., Phoenix
Arkansas	Executive Secretary, Game and Fish Commission	State Capitol, Little Rock
California	Director, Department of Fish and Game	Ferry Bldg., San Francisco 11
Colorado	Superintendent of Fur Resources, State Game and Fish Commission	1350 Sherman Street, Denver 5
Connecticut	Game Technician, State Board of Fisheries and Game	Hartford 1
Delaware	Chief Game Warden, Board of Game and Fish Commissioners	Dover

State	*Organization*	*Location*
Florida	Director, Game and Fresh Water Fish Commission	Tallahassee
Georgia	Director, State Game and Fish Commission	412 State Capitol, Atlanta 3
Hawaii	Director, Division of Fish and Game, Board of Commissioners of Agriculture and Forestry	P. O. Box 3319, Honolulu 1
Idaho	Director, Department of Fish and Game	Boise
Illinois	Director, Department of Conservation	Springfield
Indiana	Director, Division of Fish and Game, Department of Conservation	311 West Washington Street, Indianapolis 9
Iowa	Director, State Conservation Commission	East 7th and Court Streets, Des Moines 8
Kansas	Director, Forestry, Fish and Game Commission	Pratt
Kentucky	Director, Department of Conservation	Frankfort
Louisiana	Director, Division of Furs and Refuges, Department of Wildlife and Fisheries	Civil Courts Bldg., New Orleans 16
Maine	Chief Warden, Department of Inland Fisheries and Game	State House, Augusta
Maryland	State Game Warden, Board of Natural Resources, Department of Game and Inland Fish	510-514 Munsey Bldg., Baltimore 2
Massachusetts	Commissioner, Department of Conservation	15 Ashburton Place, Boston 8
Michigan	Game Division, Conservation Commission	Lansing 13
Minnesota	Commissioner, Department of Conservation	State Office Building, St. Paul 1
Mississippi	Director, State Game and Fish Commission	330 East Pearl Street, Jackson 104
Missouri	Director, State Conservation Commission	Monroe Bldg., Jefferson City
Montana	State Fish and Game Warden, State Dept. of Fish and Game	Helena
Nebraska	Project Leader, Pittman-Robertson Project, Game Forestation and Parks Commission	Lincoln 9
Nevada	Secretary, State Fish and Game Commission	Box 678, Reno
New Hampshire	Director, Fish and Game Department	State House Annex, Concord
New Jersey	Division of Fish and Game, Department of Conservation and Economic Development	State House Annex, Trenton 7
New Mexico	State Game Warden, Department of Game and Fish	Santa Fe
New York	Director, Division of Fish and Game, Conservation Department	Albany 7
North Carolina	Commissioner, Division of Game and Inland Fisheries, Department of Conservation and Development	Raleigh
North Dakota	Game Warden, State Game and Fish Department	Bismarck
Ohio	Chief, Division of Wildlife, Department of Natural Resources	1500 Dublin Road, Columbus
Oklahoma	Superintendent, Game Division, Game and Fish Department	State Capitol, Oklahoma City 5
Oregon	State Game Commission	P. O. Box 4136, Portland 8
Pennsylvania	Executive Director, Pennsylvania Game Commission	Harrisburg
Rhode Island	Administrator, Division of Fish and Game, Department of Agriculture and Conservation	State House, Providence 2
South Carolina	Director, Division of Game, Wildlife Resources Department	Columbia

State	*Organization*	*Location*
South Dakota	Director, Department of Game, Fish and Parks	Pierre
Tennessee	Director, Division of Game and Fish, Department of Conservation	304 State Office Bldg., Nashville 3
Texas	Executive Secretary, Game and Fish Commission	Austin
Utah	Director, State Fish and Game Commission	1596 West North Temple, Salt Lake City 16
Vermont	Director, Fish and Game Service, Department of Natural Resources	Montpelier
Virginia	Executive Director, Commission of Game and Inland Fisheries	Richmond 13
Washington	Director, Department of Game, State Game Commission	509 Fairview North, Seattle
West Virginia	Chief, Division of Game Management, Conservation Commission of West Virginia	Charleston
Wisconsin	Game Management Division, Conservation Department	Madison 2
Wyoming	State Game Warden, Wyoming Game and Fish Commission	Cheyenne
Canada	Chief, Canadian Wildlife Service, Department of Resources and Development	Ottawa
Alberta	Fish and Game Commissioner, Department of Lands and Forests	Edmonton
British Columbia	Game Commission	567 Burrard Street, Vancouver 1
Manitoba	Director of Game and Fisheries, Department of Mines and Natural Resources	Winnipeg
New Brunswick	Chief Game Warden, Department of Lands and Mines	Fredericton
Newfoundland	Chief Game Warden, Department of Mines and Resources	St. Johns
Northwest Territories	Director, Northern Administration and Lands Branch, Department of Resources and Development	Ottawa, Ontario
Nova Scotia	Director, Department of Lands and Forests	Halifax
Ontario	Chief, Division of Fish and Wildlife, Department of Lands and Forests	Parliament Building, Toronto
Prince Edward Island	Deputy Minister of Industry and Natural Resources	Charlottetown
Quebec	Superintendent General, Department of Fish and Game	Quebec
Saskatchewan	Game Commissioner, Department of Natural Resources	Regina
Yukon	Director, Yukon Game and Publicity Department	Whitehorse, Yukon
Mexico	Secretaria de Agricultura y Ganaderia Direccion General Forestal y de Caza	Mexico, D. F.

APPENDIX F

Publications relative to the subject matter in this book are issued by State Agricultural Colleges, experiment stations, or extension services. Such publications on various agricultural subjects may be obtained from the director of the station. They are usually free of charge.

UNITED STATES AGRICULTURAL EXPERIMENT STATIONS

State	*City*
Alabama	Auburn
Alaska	Palmer
Arizona	Tucson
Arkansas	Fayetteville
California	Berkeley 4
Colorado	Fort Collins
Connecticut:	
State station	New Haven 4
Storrs station	Storrs
Delaware	Newark
Florida	Gainesville
Georgia	Experiment
Hawaii	Honolulu 14
Idaho	Moscow
Illinois	Urbana
Indiana	LaFayette
Iowa	Ames
Kansas	Manhattan
Kentucky	Lexington 29
Louisiana	University Sta. Baton Rouge 3
Maine	Orono
Maryland	College Park
Massachusetts	Amherst
Michigan	East Lansing
Minnesota	University Farm, St. Paul 1
Mississippi	State College
Missouri	Columbia
Montana	Bozeman
Nebraska	Lincoln 1
Nevada	Reno
New Hampshire	Durham
New Jersey	New Brunswick
New Mexico	State College
New York:	
State station	Geneva
Cornell station	Ithaca
North Carolina	State College Sta., Raleigh
North Dakota	State College Sta., Fargo
Ohio	Wooster
Oklahoma	Stillwater

State	*City*
Oregon	Corvallis
Pennsylvania	State College
Puerto Rico	Rio Piedras
Rhode Island	Kingston
South Carolina	Clemson
South Dakota	Brookings
Tennessee	Knoxville 16
Texas	College Station
Utah	Logan
Vermont	Burlington
Virginia	Blacksburg
Washington	Pullman
West Virginia	Morgantown
Wisconsin	Madison 6
Wyoming	Laramie

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